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UK insurance and LDI: *two balance sheets, one long end*

How £1.1 trillion of defined-benefit pension promises and £850 billion of guaranteed insurance liabilities came to be hedged, leveraged, stress-tested and transferred — and what a derivatives professional needs to know about the plumbing that nearly broke in September 2022 and the regime that has been built since.

Research note — 10 September 2026. Iteration one of an open-ended project. Written for a senior finance professional who is fluent in derivatives but has not lived inside the UK pensions and life-insurance world, nor inside bilateral OTC trading and its valuation adjustments. Every number carries a source tag; the tags resolve to the registers at the end and to the five evidence files shipped in `02_research/`.

01

Executive summary

The UK long end is held by two balance sheets that are slowly merging. Private-sector defined-benefit (DB) schemes hold £1,068bn of assets against £854bn of liabilities on the Pension Protection Fund's s179 basis — an aggregate funding ratio of 125% and a surplus of £214bn at 31 March 2025 [C29]. UK life insurers run "over £2 trillion" of assets, of which the guaranteed, rates-sensitive slice is c.£850bn of non-linked technical provisions, and within that c.£300bn of bulk purchase annuities (BPA) [A2][A37]. The DB side is 70.6% bonds and 15.1% equities, has 73% of schemes closed to accrual, and now holds a record 12.9% of its assets as buy-in annuities — i.e. as claims on the insurers [C29]. Every year £40–50bn of liabilities move from the first balance sheet to the second [B12].

Both balance sheets are, economically, short a strip of long real bonds, and both discovered the hard way that the hedge has a liquidity leg. DB liabilities were made visible at market value by FRS17 in 2001; Boots moved £2.3bn to 100% long bonds that year, and the sector followed over two decades, from 61% equities in 2006 to 15% in 2025 [C29][C42]. Because schemes were in deficit they hedged with leverage — gilt repo and swaps — and by 2021 about £1.4–1.6trn of liabilities were hedged through liability-driven investment (LDI), roughly 10–15% of it in pooled funds running 2–4x leverage [C18][C14][C21]. On 27 September 2022 the 30-year gilt spot yield rose 50bp in a day — the largest move in the Bank of England's series — after a 131bp rise in four sessions; margin and collateral calls exceeded £70bn; LDI funds and schemes sold £37bn of gilts; the Bank bought £19.3bn of a £65bn envelope and the spiral stopped [C1][C3][C2][C55].

The regime built since 2022 is a buffer regime, and it has now been tested three times. The Financial Policy Committee's steady state is resilience to a 250bp yield rise over five days; TPR layers an operational buffer on top; Ireland and Luxembourg hard-coded a 300bp minimum for the pooled vehicles [C11][C12][C15]. Buffers went from ~150bp to ~300bp, leverage in Irish funds from 2.5x back to 1.7x, and the LDI market's notional shrank from £1.5trn to £0.7trn with duration down from ~20 to ~13 years [C34][C14]. The Bank's system-wide exercise (SWES, November 2024) found the same shock now produces £4.7bn of gilt sales instead of £38bn — but also that dealers' balance sheets, not LDI funds, are the binding constraint, and that "over a third" of managers who planned to draw extra repo would have been refused by every bank [C22][D20]. The January 2025, April 2025 and March 2026 episodes passed; in March 2026 NBFI variation-margin calls were £0.4bn against £13bn in autumn 2022, and the amplifier was hedge-fund repo deleveraging, not pensions [C26][E37].

On the insurer side the regime is Solvency UK, and its engine is the matching adjustment (MA). An annuity writer may discount its liabilities at risk-free plus most of the credit spread on the assets it holds to maturity; the retained part, the fundamental spread, is the PRA's estimate of expected default and downgrade cost [B28]. At end-2020 the MA was worth c.£81bn to the sector's balance sheets — £37bn of own funds plus £44bn of SCR relief — around 38–40% of eligible own funds, against a total industry capital base Sam Woods put at £112bn [B34][B35][A49]. The 2023–25 reforms cut the risk margin by 65%, admitted "highly predictable" cash flows (capped at 10% of MA benefit), removed the sub-investment-grade cliff, added notched fundamental spreads and a senior-manager attestation, and created an investment accelerator; HMT declined the PRA's request to raise the fundamental spread [B26][B23][B24][B45]. The first published-by-name stress test (LIST 2025) took sector coverage from 185% to 154% under a 1-in-100 scenario, and a further 10 points to 144% when half the sector's funded reinsurance was recaptured [B7][B8].

Bulk annuities are a £40–50bn-a-year industry pricing below gilts, and the marginal capital has been coming from Bermuda. Volumes: £49.1bn (2023, record), £47.8bn (2024), £38bn on a record ~370 deals (2025), with H1 2026 slow at around £10bn against January forecasts of a £50bn+ year [B12][B10][B3][B30]. Full buy-ins have priced at gilts +0.1% to +0.4% a year — cheaper than holding gilts — because the insurer replaces the scheme's gilts with an MA portfolio that is ~40% illiquid private assets, reinsures 70–90% of the longevity, and, for c.15% of new business, cedes the whole block to a funded reinsurer holding 2–4% capital instead of 11–15% [A29][B5][B17][B19]. The PRA's answer, CP8/26 (29 April 2026), sets a prescribed counterparty haircut equal to the fundamental spread of a financial corporate of the reinsurer's rating, lifting the charge to ~10% from 1 July 2027, grandfathering only deals completed by 30 September 2026, and reserving volume limits pending LIST 2028 [B19][E3].

For a dealer, the pension or insurer relationship is priced through collateral terms, and the UK has chosen to keep it bilateral. The pension-scheme clearing exemption was made indefinite in June 2025 on the explicit ground that schemes cannot post cash variation margin without selling assets; the EU let its exemption expire in 2023 [D2][D3][D1]. Uncleared trades carry mandatory VM (since 2017) and, above €8bn of notional, regulatory IM; in the year-end 2025 ISDA survey 51.7% of uncleared collateral was non-cash, concentrated in government bonds [D7][D9][D13]. At a CCP, VM is cash-only; LCH is going the other way and adding a 25% cash floor to house margin [D14][D15]. Our illustrative arithmetic for a 30-year £100m receive-fixed swap puts the dealer's all-in xVA at roughly 0.5–2bp cleared, 7–17bp under a two-way CSA, and 20–60bp uncollateralised — with the dominant term being capital (KVA), which is why the UK's 2027 removal of the pension-fund CVA exemption, softened by a 3.5%/8.5% risk-weight bucket and $\alpha = 1$, matters most for the few legacy one-way relationships that remain [D28][D33]. The cost does not disappear when a scheme clears; it moves to the scheme's own initial-margin funding.

The pipeline out to 2030 is dated and dense. Insurer liquidity reporting capturing derivative margin goes live on 30 September 2026; the funded-re grandfathering line falls the same day; Basel 3.1 lands in the UK on 1 January 2027; the funded-re capital rules on 1 July 2027; surplus-release regulations under the Pension Schemes Act 2026 in Q2 2027; T+1 settlement on 11 October 2027; LIST 2028 launches in January 2028; the superfund regime in 2028; the Bank's gilt-repo haircut and clearing proposals in early 2027; and RPI is aligned to CPIH in February 2030 with no compensation to index-linked gilt holders [E12][E1][E55][E27][E64][E10][E41][E54]. Meanwhile the DMO has cut long conventionals to 9.1% of a £246bn remit because "demand ... in particular from the domestic pension fund sector" has gone, and the 30-year gilt yield reached 5.97% on 18 August 2026, a level the 25-year series last saw in June 1996 [E47][E48][C55].

What to take from iteration one. The UK long end has moved from a captive, leveraged, price-insensitive buyer (LDI) to a price-sensitive one (insurers with a return hurdle, hedge funds on repo), and the regulatory machinery is now aimed at the second. The three things a product person should watch are the collateral terms (who can post what, and at what haircut), the capital arithmetic on long-dated uncollateralised exposure, and the funded-reinsurance channel through which UK annuity risk — and its hedging demand — leaves the country.

£214bn	**+50bp**	**c.£81bn**	**£38bn**
DB aggregate s179 surplus, 31 Mar 2025 (funding 125%) — PPF Purple Book 2025	30-year gilt spot, 27 Sep 2022 — largest daily rise in the BoE series	Balance-sheet benefit of the matching adjustment at end-2020 — PRA	Bulk annuity premium 2025, a record ~370 deals — Hymans/LCP

02

The map: who holds the UK long end

Two balance sheets carry almost all of the UK's long-dated sterling liabilities, and they are converging. On the pensions side the PPF's Purple Book 2025 counts 4,840 private-sector DB schemes with 8.6 million members, £1,068bn of assets, £854bn of liabilities on the s179 (PPF-compensation) basis and £1,115bn on a full buy-out basis; 73% are closed to accrual and 4% remain open to new members [C29][C31]. On the insurance side, the Bank's December 2025 Financial Stability Report puts UK life insurers at "over £2 trillion" of assets, most of it unit-linked business where the policyholder bears the market risk; the PRA's April 2026 funded-reinsurance consultation gives the guaranteed core as c.£850bn of non-linked technical provisions, of which BPA is c.£300bn [A37] [A2]. General insurance — motor, property, Lloyd's — is short-tailed and barely features in what follows.

What connects them is the annuity. A DB scheme promises inflation-linked pensions for life; an annuity is the same promise sold by an insurer for a single premium. When a scheme buys a bulk annuity (a "buy-in") the promise moves from the first balance sheet to the second; when the policy is converted to individual annuities and the scheme winds up (a "buy-out") the transfer is complete. The Purple Book records annuities at a record 12.9% of DB assets after £56bn of risk-transfer deals in 2024 [C29]. Rothesay's 2026 survey counts 374 new buy-ins agreed in 2025 against only 159 schemes reaching buy-out — the administrative queue is now the bottleneck [B38].

Both balance sheets are short the same instrument. For a derivatives reader the cleanest description of a DB liability or an annuity book is a strip of survival-weighted, inflation-linked zero-coupon bonds out to 60+ years. The scheme or insurer is short that strip. Whoever holds it needs long real duration, and the natural supply is index-linked and long conventional gilts, of which DB schemes held about 90% of the index-linked stock in 2022 [C18]. The DMO's 2026-27 remit sells only £22.4bn of long conventionals (9.1%) and £23.0bn of linkers (9.3%) out of £246.2bn, and the Debt Management Report says why: "Market feedback suggested declining demand for long-dated conventional gilts over the medium term, in particular from the domestic pension fund sector" [E47] [E48].

The players on the insurance side are few, well-capitalised, and increasingly owned by private capital. Ten or eleven insurers write bulk annuities. 2025 shares by premium: Legal & General 27% (£10.2bn), Pension Insurance Corporation 18% (£6.8bn), Rothesay 14% (£5.2bn), Aviva 12% (£4.6bn), Standard Life and Just 8–10% each, M&G and Royal London ~4% each, Canada Life 3%, Utmost 1% [A28] [A29]. Year-end 2025 solvency coverage ran from 176% (Standard Life) to 257% (PIC) [A25]. In 2025–26 three of them changed hands: Athora (Apollo/ADIA-backed) completed its c.£5.7bn purchase of PIC on 27 March 2026 and will move its headquarters from Bermuda to the UK; Brookfield Wealth Solutions completed its takeover of Just on 1 April 2026 and is folding its Blumont start-up into it; JAB agreed to buy Utmost Life and Pensions in December 2025 [A12] [A13] [A21] [A23].

The players on the pension side are thousands of trustee boards served by a handful of LDI managers. TPR's 2025 scheme-return analysis: 2,429 of 4,710 responding schemes (52%) have LDI mandates — 1,957 pooled and 469 segregated — and "over 80% of the LDI mandates by AUM are managed by five managers" [C34]. Earlier surveys had LGIM, Insight and BlackRock at 87–90% of LDI assets [C53] [C54]. This concentration is why a shock to one product design (the pooled, leveraged, limited-recourse fund) became a shock to the gilt market.

BALANCE SHEET	SIZE	LIABILITY	WHO BEARS THE MARKET RISK	REGULATOR
Private DB schemes	£1,068bn assets; 4,840 schemes	Inflation-linked pensions, s179 £854bn / buy-out £1,115bn	Sponsor (via deficit contributions), then PPF	TPR; PPF as insurer of last resort

BALANCE SHEET	SIZE	LIABILITY	WHO BEARS THE MARKET RISK	REGULATOR
Life insurers, non-linked	c.£850bn technical provisions	Annuities (c.£300bn BPA), protection, with-profits guarantees	Shareholder capital (SCR coverage 176–257%)	PRA (Solvency UK)
Life insurers, unit-linked/DC	Bulk of the >£2trn	Policyholder-borne	Policyholder	PRA/FCA

Sources: [C29][A2][A37][A25].

03

How we got here: the product history in six moves

Move one (2000): Equitable Life, or a guarantee is an option. Equitable sold with-profits pensions with guaranteed annuity rates — typically £100 of cash at retirement convertible into £10 a year — to some 90,000 policyholders; in derivatives terms it wrote long-dated receiver swaptions and a put on mortality improvement and did not hedge them [A55][A54]. As rates fell in the 1990s the guarantees went deep in the money. Equitable tried to neutralise them by paying lower terminal bonuses to guarantee holders; the House of Lords ruled against it in *Hyman* on 20 July 2000, adding about £1.5bn of liabilities; the Society closed to new business on 8 December 2000 and cut policy values by 16% in 2001 [A54][A55]. The regulatory legacy — realistic balance sheets, individual capital assessments, and eventually Solvency II's market-consistent valuation of guarantees — is the intellectual root of everything in Part 5.

Move two (2001): FRS17 and Boots, or the liability becomes a bond. FRS17 put a scheme's surplus or deficit on the sponsor's balance sheet at market values, discounted at AA corporate yields; John Ralfe's contemporaneous account of the Boots switch cites support for "FRS 17, which makes pension valuations transparent on a market basis, rather than keeping them opaque under SSAP 24" [C42]. Boots moved a £2.3bn scheme with 72,000 members from 75% equities to 100% long-dated AAA sterling bonds (25% index-linked, weighted maturity 30 years) over fifteen months to July 2001, cutting fees from ~£10m to £0.25m a year, on the argument that "conventional wisdom that equities outperform bonds ... crucially ignores risk" [C42][C43]. In 2001 a typical scheme held ~75% equities; twenty years later the sector held ~70% bonds [C43].

Move three (2005): the statutory funding regime, or the liability gets a discount rate. Part 3 of the Pensions Act 2004, in force from 30 December 2005, requires every scheme to "have sufficient and appropriate assets to cover its technical provisions", with trustee-chosen but prudent assumptions that in practice are expressed as gilts + x% [C41]. Four bases now coexist and a product person should keep them apart: technical provisions (gilts + x, trustee-set); accounting (IAS19/FRS102, AA corporate yields); PPF s179 (gilt-based, approximating the cost of PPF-level benefits — a 0.3pp rise in gilt yields cuts s179 liabilities by ~4.0% and assets by ~3.7%); and buy-out (the insurer's price, "often the highest value on the scheme's liabilities") [C32][C33]. TPR's 2024 Funding Code codified the endpoint: a "low dependency" target of roughly gilts + 0.5% at significant maturity [C40].

Move four (2005–2021): leveraged LDI, or hedging a deficit you cannot afford to hedge. Once the liability is a long real bond, an unhedged scheme is short one. But deficit schemes needed growth assets to close the gap, and a fully hedged portfolio would have consumed every pound in gilts. LDI squared the circle with leverage: "LDI strategies enable DB pension schemes to use leverage to increase their exposure to long-term gilts. They also allow pension schemes to hold riskier and higher-yielding 'growth' assets such as equities in order to boost their returns and so reduce their deficits" [C3]. The market grew from £446bn of liabilities hedged in 2012 to over £1trn in 2018 and £1.4trn by end-2021, with 92% of new mandates pooled in the late 2010s [C53][C54][C18]. The House of Lords committee's later verdict: "LDI strategies are a solution to an artificial problem" created by accounting standards [C17].

Move five (2015–2016): pension freedoms and Solvency II, or the retail annuity dies and the bulk annuity is born. The 2015 pension freedoms removed the effective requirement to annuitise; individual annuity sales fell 75% between Q3 2013 (90,414 contracts) and Q3 2015 (22,380) [A59]. Higher rates have brought them partly back — £7.4bn and 87,600 contracts in 2025, the highest since freedoms were announced [A56] — but the life industry's growth engine became the bulk annuity, whose economics Solvency II (in force 2016) shaped through the matching adjustment. The first modern partial buy-in was Hunting Pension Scheme at end-2006; before 2006 there were "just two insurers writing about £1bn per year"; by 2026 "over 95% of transactions are full buy-ins" [B14].

Move six (2022–2026): the crisis, the surplus and the endgame. The September 2022 shock nearly broke the LDI plumbing; the same rise in yields pushed the DB sector into surplus (s179 funding 94.9% in March 2020, 125.0% in March 2025) and lifted the share of schemes fully funded on a buy-out basis from below 5% in 2021 to around 45% in 2026, forecast to reach 80% within five years [C30][C29][B17]. Bulk annuity volumes roughly doubled from the 2020–22 run-rate to £49.1bn in 2023 [B12]. The Pension Schemes Act 2026 (Royal Assent 29 April 2026) now lets well-funded schemes release surplus at a low-dependency threshold instead of buying out, which is the live "run-on versus buy-out" debate [E23][B43].

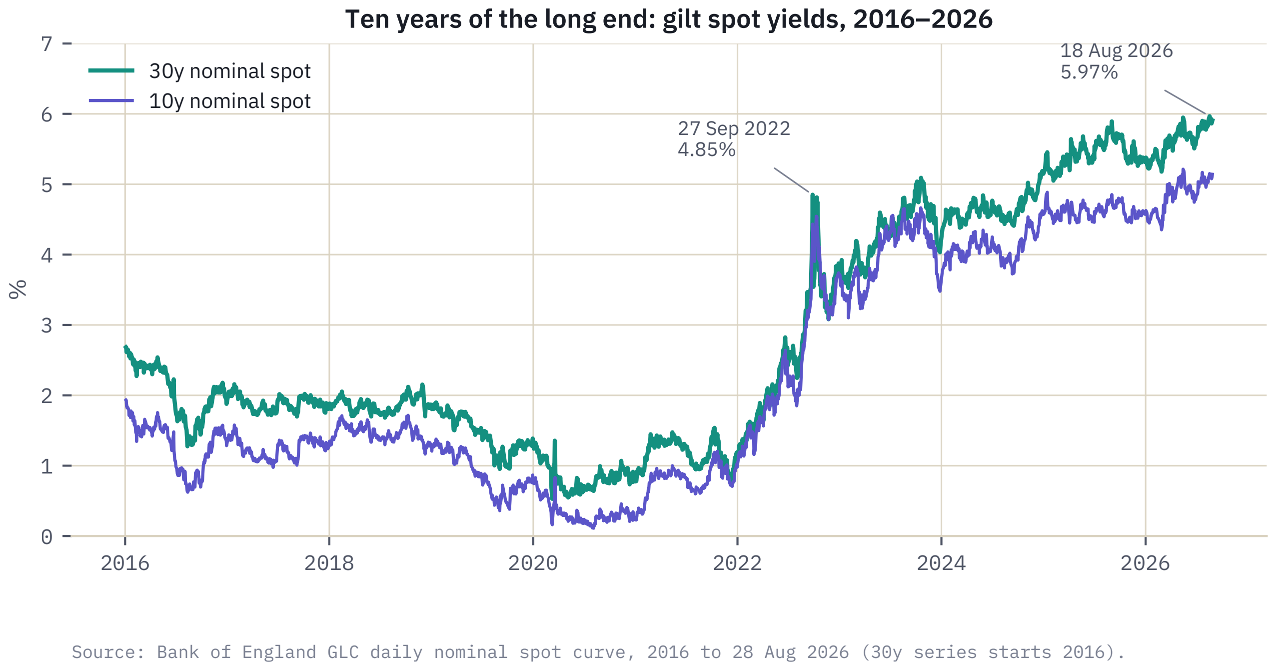


Figure 1 — Gilt spot yields 2016–2026. The 2022 spike was a liquidity event; the 2025–26 highs are a demand event. Source: Bank of England GLC daily nominal spot curve [C55].

04

The scheme's machine: how LDI works

The hedge is a duration and inflation position, and the instruments are ordinary; the leverage and the collateral chain are what make it interesting. The toolkit, in rough order of use: physical gilts and index-linked gilts; gilt repo (sell a gilt, agree to buy it back, use the cash to buy more gilts — the scheme "retains economic exposure to the gilt throughout the transaction"); interest-rate swaps (receive fixed, pay SONIA); RPI inflation swaps; gilt total-return swaps; swaptions only at the margin [C49][C3]. Industry estimates put interest-rate swaps at ~42% and inflation swaps at ~17% of UK pension derivative notional, and "over 25% of U.K. pension interest rate hedges come from derivative markets" versus under 10% in the US [C48].

Hedge ratios are quoted against a liability basis, and the basis matters. A scheme "80% hedged" has removed 80% of the interest-rate (and separately inflation) sensitivity of its liabilities *as measured on a chosen basis* — technical provisions, gilts-flat, or buy-out. By September 2022 UK schemes had hedged ~85% of their interest-rate risk, against ~50% in the Netherlands [C18]. The choice of basis is not academic: a buy-out liability discounted at gilts + 0.2% has more duration than a technical-provisions liability at gilts + 1.5%, so a scheme moving to buy-out re-sizes its hedge.

The chain has four links, and the weak one was the pooled fund. Pension scheme → LDI fund (pooled, or a segregated "fund of one") → repo counterparty / swap dealer → central counterparty. Cleared swaps at LCH take cash variation margin, so a rise in yields is a cash drain the same morning, not a paper loss [D14]. Pooled funds are Irish or Luxembourg AIFs with many small investors and limited recourse: the fund's only capital is its net asset value; when losses erode it the manager issues a recapitalisation notice to every investor, and if cash does not arrive it de-levers by selling gilts. Segregated mandates can pledge the scheme's wider assets and behave more like a US separately-managed account [C48][C3]. Irish-resident GBP LDI funds — ≈£300bn, about 60% of all pooled GBP LDI and ~10% of the gilt stock — ran leverage (total assets over NAV) of 1.7x in 2021, spiking to 2.5x in September 2022 [C14][C15]. Industry estimates of pooled leverage *targets* were "~4x with typical ranges between 1x–6x" [C48].

The unit of resilience is the yield buffer. The Central Bank of Ireland defines it as "the level of yield adjustment on long-term gilts that the GBP LDI Fund is insulated from or may absorb before its capital reserves are exhausted" [C13]. TPR's version is a collateral waterfall: an operational buffer for normal volatility, a stress buffer of at least 250bp sized on the assumption that the scheme can replenish within five working days, and a documented order of assets to sell — first, second and third choices — with pre-agreed sale plans (85% of LDI-using schemes now have them) and manager discretion to redeem growth assets (74%) [C12][C34].

Worked example: a 3x pooled fund meets a 100bp shock

The arithmetic below is in `00_note/xva_model.py` (function `ldi_example`). It is illustrative: 30-year gilts, modified duration 20, no convexity, no recapitalisation.

Set-up. A pooled fund has £100 of NAV and holds £300 of 30-year gilts, funded by £200 of gilt repo: leverage 3x. It hedges a scheme with £300 of duration-weighted liability exposure. Each basis point moves the gilt position by £300 × 20 × 0.0001 = **£0.06**. The fund's yield buffer is 100 / 0.06 ≈ **167bp** — almost exactly the 170bp median the Central Bank of Ireland measured for Irish LDI funds in October 2022 [C14].

Step 1 — yields rise 100bp. The gilts fall ~20%: a £60 loss. NAV is £40, exposure still £300, so leverage is now **7.5x**. Another 67bp and NAV is zero.

Step 2 — the cash leaves immediately. The repo counterparty marks the collateral daily and calls £60; a cleared swap would call the same cash VM that morning. The fund posts from its cash buffer, which is now gone, and issues a recapitalisation notice: it needs **£60** of new capital to restore 3x — or must sell £180 of gilts to bring exposure down to £120 against £40 of NAV.

Step 3 — the scheme's side. The scheme is not poorer: its liabilities also fell ~£60, so funding is unchanged or better [C3]. But it needs £60 of cash inside the window. For a small scheme in a pooled fund that means instructing a consultant, getting trustee signatures (TPR found 331 non-delegating schemes with four or fewer authorised signatories), redeeming a corporate-bond or diversified-growth fund with T+3 to T+5 settlement, and wiring cash to a custodian that in 2022 was "reliant on manual processing" [C3][C34]. The FPC's 250bp calibration assumes this takes **five days** [C11].

Step 4 — the loop. If cash does not arrive the manager sells gilts. In September 2022 the aggregate implied sales were "at least £50 billion ... as compared to recent average market trading volumes of just £12 billion per day" [C1]. Sales push yields up, which triggers the next round of calls on every other fund — "a self-reinforcing spiral of price falls and further pressure to sell gilts" [C1]. Pooled funds also face a coordination failure: "individual pension funds had less incentive to step in, as the benefits would have been shared by all participants but the costs borne privately" [C20].

Step 5 — what the new rules do. With a 350bp total buffer (250 stress + 100 operational) and 20-year duration, NAV must cover 0.20 × 3.5 = 70% of exposure, so maximum leverage is about 1/0.7 ≈ **1.4x**; the same £100 hedges ~£143 of liabilities, not £300 [C12]. That is why the LDI market's notional fell from £1.5trn to £0.7trn and its duration from ~20 to ~13 years, why Irish funds returned to 1.7x, and why the SWES found only £4.7bn of gilt sales for a 115bp shock [C34][C14][C22]. The un-hedged residual has instead been removed by buying it out.

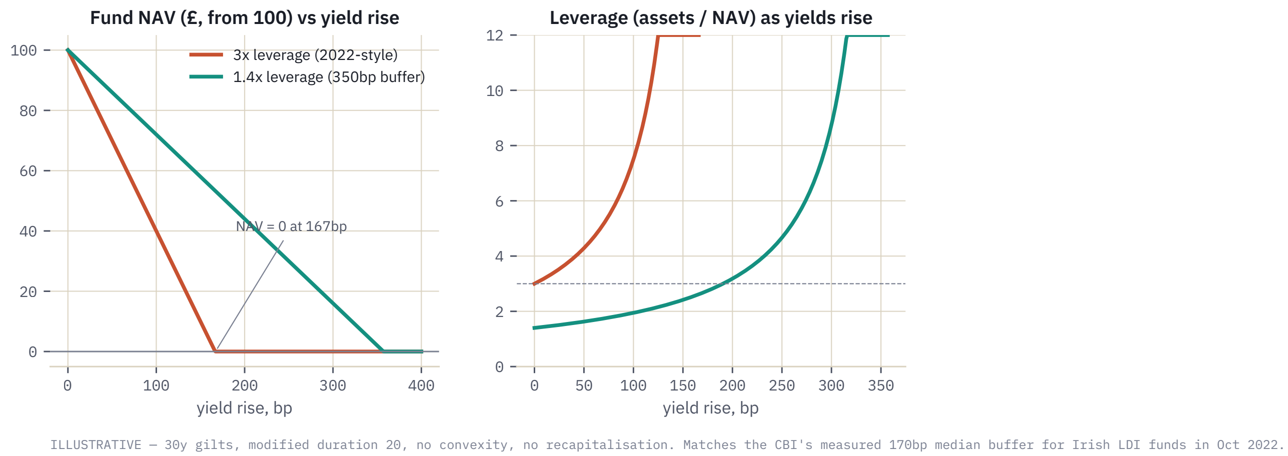


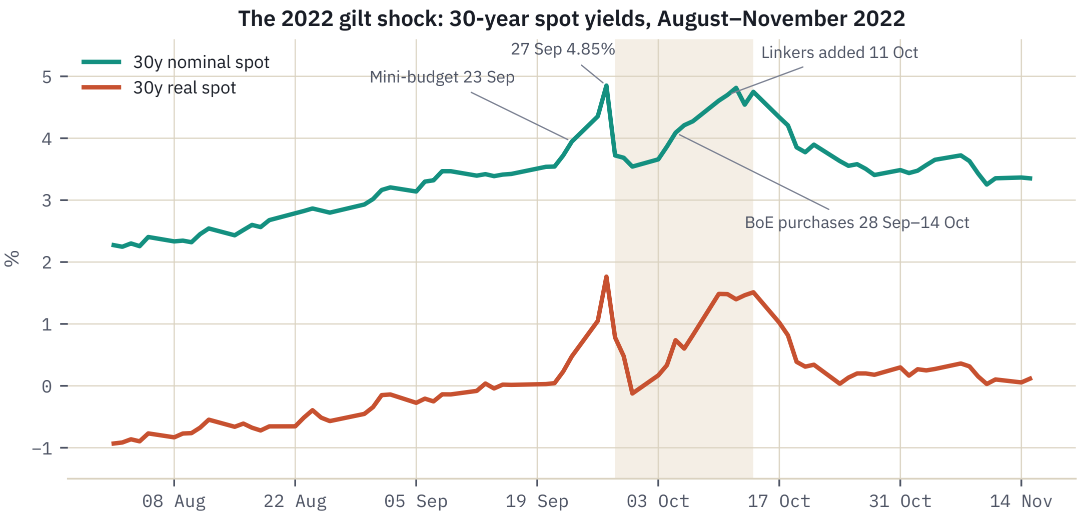
Figure 2 — NAV and leverage of the illustrative pooled fund as yields rise. Source: `xva_model.py`, illustrative.

Why long gilts traded below swaps, and why that flipped. Klingler and Sundaresan show that underfunded pension plans "optimally use swaps for duration hedging" because swaps need margin rather than capital, and that aggregate underfunding predicts 30-year swap spreads "while leaving shorter-maturity spreads unaffected" — receive-fixed demand plus constrained dealer balance sheets pushed long swap rates below gilt yields [C50]. The BIS attributes the post-2022 re-widening of negative spreads across currencies to heavy issuance, positive repo funding costs and the RFR transition [C51]. A UK-specific 30-year asset-swap series was not found in a free primary source (see Caveats); the direction — LDI de-hedging removes receive-fixed demand while gilt supply is record-high — is consistent with the Bank's account of the long end moving to price-sensitive buyers [C26].

05

September 2022: the crisis, the intervention and the regime that followed

The shock was without precedent in the Bank's data. From the Bank's own spot curve (re-computed for this note from the published spreadsheets, `tools/boe_glc.py`): the 30-year nominal spot yield was 2.27% on 1 August 2022, 3.54% on 21 September, 3.72% on 22 September (the day of a 50bp Bank Rate rise), 3.95% on the mini-budget Friday (23 September), 4.35% on Monday 26th and 4.85% at the close on Tuesday 27th — +131bp in four sessions — before falling 113bp to 3.72% on the 28th after the Bank's announcement [C55]. The three largest one-day rises in the 30-year series since 2016 are 27 September (+50bp), 26 September (+41bp) and 10 October (+33bp); the largest fall is 28 September (−113bp). The Bank's December 2022 FSR records "two daily increases in 30-year gilt yields of more than 35 basis points, while the biggest daily increase since 2000 prior to this had been 29 basis points", a 140bp four-day move "more than twice as large as the largest move since 2000", and a rise of more than 270bp between 1 August and the 14 October peak, "briefly exceeding 5%" [C3]. Real yields moved more: the 30-year real spot went from −0.93% on 1 August to +1.76% on 27 September, 270bp in the instrument LDI funds are most concentrated in [C55].



Source: Bank of England GLC daily spot curves (nominal, real), end-of-day; computed by tools/boe_glc.py. Shaded: Bank purchase window.

Figure 3 — 30-year nominal and real spot yields, August–November 2022, with the Bank's purchase window shaded. Source: Bank of England GLC daily data [C55].

DATE	30Y NOMINAL	30Y REAL	WHAT HAPPENED	SOURCE
1 Aug 2022	2.27%	−0.93%	FPC reference point for the ">270bp" rise	[C3][C55]
22 Sep	3.72%	+0.23%	MPC raises Bank Rate 50bp	[C20][C55]
23 Sep (Fri)	3.95%	+0.48%	Mini-budget	[C1][C55]
26 Sep (Mon)	4.35%	+1.05%	+41bp on the day	[C1][C55]
27 Sep (Tue)	4.85%	+1.76%	+50bp — largest rise in the series; market intelligence of ≥£50bn forced sales	[C1][C55]
28 Sep (Wed)	3.72%	+0.78%	11:00 Bank announces purchases of >20y conventionals, up to £5bn per auction, to 14 Oct; −113bp	[C4][C55]
5 Oct	4.09%	+0.74%	Cunliffe letter: £3.7bn bought of £10.4bn offered in six operations	[C1]
10 Oct (Mon)	4.61%	+1.49%	Auction cap doubled to £10bn; TECRF launched (corporate bonds to BBB− eligible)	[C5][C55]
11 Oct	4.70%	+1.48%	Index-linked gilts added to purchases	[C2][C3]
12 Oct	4.81%	+1.40%	20y spot 5.04% — the "briefly exceeding 5%"	[C3][C55]

DATE	30Y NOMINAL	30Y REAL	WHAT HAPPENED	SOURCE
14 Oct (Fri)	4.75%	+1.51%	Operations end; £19.3bn bought (£12.1bn conventional, £7.2bn IL); Chancellor dismissed	[C2] [C6]
17 Oct	4.34%	+1.02%	Most measures reversed; Bank: purpose was "to provide time ... not to provide a permanent backstop"	[C6] [C55]
30 Nov 2022	–	–	CBI/CSSF letter: 300–400bp average yield buffer expected	[C13]

The mechanics were quantified by the Bank. Total margin and collateral calls on LDI funds and schemes were "in excess of £70 billion" between 23 September and 14 October; DB schemes sold ~£14bn of gilts and LDI funds ~£23bn in the window; "raising additional funds quickly was a particular problem for many pooled LDI funds, given operational lags and the large number of smaller investors" [C3]. Bank researchers later estimated that LDI selling accounted for about half of the fall in gilt prices (fiscal policy the other half), with a peak LDI-induced price discount of ~7%, ~£25bn of LDI gilt sales over five weeks, and pooled funds selling ~11 percentage points more of their holdings than single-client funds [C9]. Irish funds alone sold £23bn gross (£11bn net) and received £41bn of equity subscriptions; about a quarter of gilt-holding Irish LDI funds lost more than 80% of NAV [C14].

The intervention was small relative to the envelope, and it was priced to be unattractive. The 28 September notice authorised up to £5bn per auction of conventional gilts with residual maturity above 20 years — the £65bn figure is thirteen auctions times £5bn [C4]. The Bank bought only £3.7bn of £10.4bn offered in the first six operations, and £19.3bn in total; "on no occasion during the period of support was the auction fully allocated" [C1] [C2] [C3]. The Bank's own account of the backstop pricing: "the purpose of the wide (or outside) spread is to ensure that the intervention is only supporting, not replacing, the market until it recovers" [C7]. The holdings were sold back between 29 November 2022 and 12 January 2023; a later Bank Underground study puts the operation at 0.9% of GDP with a monetary-policy footprint of 1–5bp of Bank Rate [C7] [C10].

The lesson the authorities drew was about buffers, operations and the pooled structure. FSR December 2022: "This episode demonstrated that levels of resilience across LDI funds to the speed and scale of moves in gilt yields were insufficient, and that buffers were too low and less usable in practice than expected" [C3]. The Lords Industry and Regulators Committee: "The evidence we heard overwhelmingly suggests that the use of LDI strategies caused the Bank of England intervention" [C17]. The Work and Pensions Committee recorded Andrew Bailey's observation that "by looking at the 85%, the 15% remained relatively obscure" — the segregated majority was well understood, the pooled minority was not [C18].

The regulatory chain, in order. CBI/CSSF (30 November 2022): GBP LDI funds should maintain "an average Yield Buffer in the region of 300–400 basis points", which the FPC noted "would currently imply resilience to long-term gilt yields of around 7%" [C13] [C3]. FPC (29 March 2023): a minimum of 250bp — ~80bp baseline (the 99.8th percentile of rolling five-day moves) plus ~170bp systemic (a 1-in-100-year five-day shock) — measured over five days because that is how long a scheme takes to deliver collateral [C11]. TPR (24 April 2023): an operational buffer on top of the 250bp stress buffer, so a total of around 350bp [C12]. Ireland and Luxembourg (29 April 2024, ESMA-endorsed): a hard 300bp minimum yield buffer under AIFMD Article 25, defined on NAV [C15][C16]. Observed buffers: ~150bp before October 2022, ~300bp now [C34].

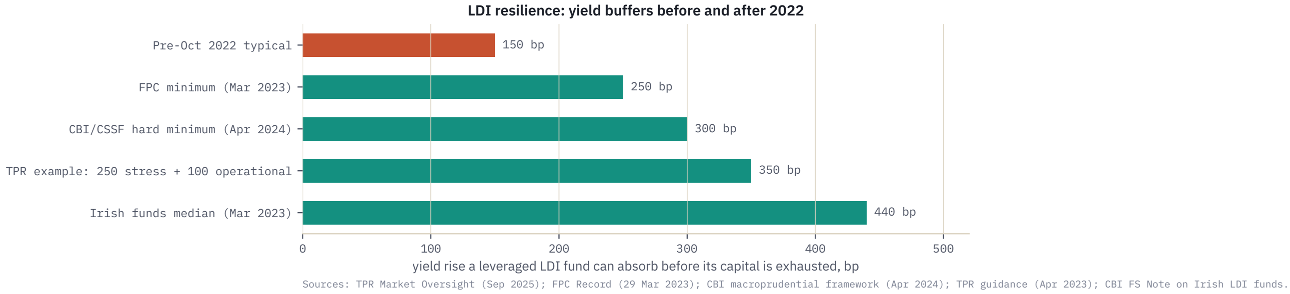
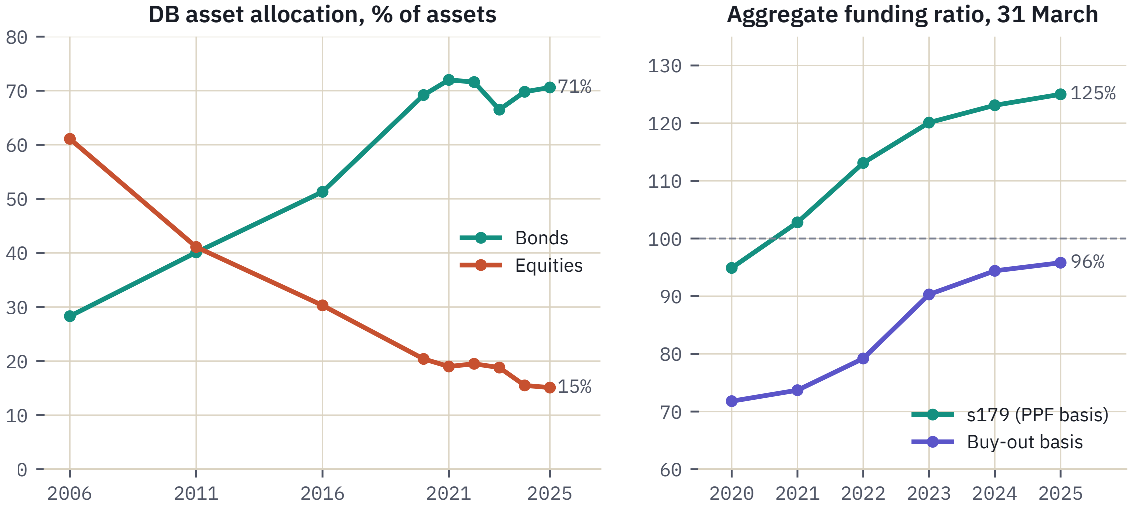


Figure 4 — Yield buffers before and after. Sources: TPR, FPC, CBI/CSSF [C34][C11][C15][C12][C14].

The system was re-tested in a laboratory and then three times in the wild. The Bank's System-Wide Exploratory Scenario (final report 29 November 2024; ~50 firms; gilt yields +115bp over 10 days, sterling IG spreads +130bp) found NBFIs faced ~£94bn of margin calls (85% VM), LDI funds sought £16.5bn of recapitalisation from schemes, and NBFIs sold only ~£4.7bn of gilts against ~£38bn in the first three weeks of 2022 — but that "most banks had no or very little appetite to increase the value of clients' repo financing", that "over a third" of fund managers planning extra repo would have been refused by every bank, and that only ~£0.5bn of additional long-gilt sales would have exhausted dealers' warehousing appetite [C22][D20]. The live tests: January 2025 (30-year at a 26-year high; LDI "resilient and orderly"), April 2025 (gilt/repo conditions "beginning to deteriorate ... but remained orderly"), and the March 2026 Middle East shock, where the Bank reports hedge-fund deleveraging amplified gilt moves but "the LDI sector also remained resilient", with aggregate NBFI rate-VM calls of ~£0.4bn (27 February–9 March 2026) versus ~£13bn in autumn 2022 [C46][C24][C26].

The Bank now stands behind pension funds and insurers directly. The Contingent NBFI Repo Facility (CNRF) opened for applications on 28 January 2025 to insurers, DB schemes and LDI funds holding more than £2bn of gilts; it lends cash against gilts for one to two weeks, at a price "attractive in times of stress but expensive relative to pricing in normal times", activated only "in episodes of severe gilt market dysfunction"; the annual fee is £8,000 [C23][D21][D22]. By the Bank's 2025–26 market-operations report it had onboarded two participants with six applications in process, and had never been activated [D23].

The buyer of long gilts has changed, and the amplifier has moved. "The weighted average maturity of pension fund and LDI gilt net purchases has fallen from around 25 years in 2018 to about 14 years in 2026" [C26]. Hedge funds have "shifted from being net cash lenders in gilt repo to net cash borrowers": ~£100bn of net borrowing at the December 2025 FSR, £74bn after a 21% cut in March 2026, £85bn by June, and ~60% of secondary cash gilt volumes in January–February 2026 [C25][E37][C28]. "Half of all haircuts are routinely set at zero in the bilateral market, with haircuts on hedge fund repo transactions commonly set at zero" [C28]. The Bank's repo policy track — discussion paper September 2025, feedback statement April 2026, Breeden's July 2026 case for risk-sensitive minimum haircuts and more clearing — promises "a comprehensive update, including potential policy proposals, in early 2027" [D17][D18][D19]. The Bank's own reading of counterfactuals is worth keeping: "had a broad-based central clearing mandate been in place at the time of the September 2022 LDI episode, there would have been more pressure on the gilt cash and gilt repo markets as pension funds would have sought to liquidate assets to post VM in cash" [D18].



Source: PPF Purple Book 2025 (Fig 7.3; funding tables) and Purple Book 2024. Weighted averages, PPF universe of ~4,840 schemes.

Figure 5 — The DB sector's two decades: allocation flipped from equities to bonds; the 2022 yield shock pushed funding ratios into surplus. Source: PPF Purple Book 2025, 2024 [C29][C30].

06

The insurer's machine: Solvency UK and the matching adjustment

The balance sheet is market-consistent, and the four words to learn are BEL, risk margin, SCR and own funds. Assets are at fair value. Liabilities are the best estimate liability (BEL) — expected cash flows discounted at the risk-free (SONIA) curve plus, for annuity books, the matching adjustment — and a risk margin, the cost of capital a third party would need to run off the non-hedgeable risks. Own funds are assets minus technical provisions. The Solvency Capital Requirement (SCR) is a one-year 99.5% VaR of own funds, computed by a prescribed standard formula or an approved internal model (the large BPA writers use internal models). Coverage is own funds over SCR: 185% for the eleven BPA writers at end-2024 in the PRA's stress test, and 176–257% for the listed and large private firms at end-2025 [B7][A25]. Two legacy items: the transitional measure on technical provisions (TMTP), a run-off to 2032 of the Solvency I → II step change, now worth only £4.7bn (5% of own funds, from 22% at LIST 2022); and the volatility adjustment, which annuity writers do not use because they have the MA [B7][B25].

The matching adjustment is the engine, and the fundamental spread is the governor. SS7/18: the MA "is an adjustment to the discount rate used to value certain insurance liabilities that represents a proportion of the spread (above the relevant risk-free rate) that an insurer projects to earn over the future lifetime of the assets matching its MA liabilities"; "the total credit spread can be separated into two components: the FS, which reflects compensation for the risks retained by the firm, and the MA, which is the residual spread ... The FS covers (at least) an allowance for expected default and downgrade losses" [B28]. The FS is probability of default × loss given default (30% recovery assumed) plus the cost of downgrade, floored at 35% (30% for gilts) of the 30-year average spread; the PRA publishes tables by currency, sector, credit quality step and tenor, and since 31 December 2024 by notch (AA+ ≠ AA–) [B28]. The logic: an insurer that holds a bond to maturity against a liability it cannot be forced to sell does not bear the bond's liquidity or spread-volatility risk, only its default risk — so it may earn the difference.

The MA is worth roughly a third of the sector's capital. At end-2020 "life insurers' balance sheets benefitted from the MA by c.£81 billion (a c.£37 billion increase in Own Funds coupled with a c.£44 billion reduction in the SCR)", "just over 38% of the total Own Funds"; similar at end-2021, and "around 40% of eligible own funds at end 2022" [B34][B35]. Sam Woods in July 2022: "the total assets in MA portfolios amount to around £380 billion", the MA "confers a capital benefit on insurers of around £80 billion", and "the entire capital base of the life insurance industry is around £112 billion" [A49]. No newer aggregate £ figure has been published (see Caveats). The second half of the benefit — the SCR reduction — comes from the fact that in a spread-widening stress the MA *rises* (the FS is largely static), offsetting mark-to-market asset losses; that is the mechanism behind the muted LIST 2025 results and KPMG's verdict that "the MA served its purpose by helping to mitigate short-term volatility and allowing insurers to avoid forced sale of assets" [B9].

Worked example: the MA on a £100 bond

From `xva_model.py` (function `ma_example`), using the IFoA working party's illustrative calibration: asset spread 122bp over risk-free, fundamental spread 45bp, MA 77bp [B47]. Risk-free 4.50%; a single £100 liability payment in 12 years, a proxy for a pensioner book.

- Bond yield 5.72%. Of the 122bp, 45bp is deemed compensation for expected default (PD × 70% LGD) and downgrade — risk the insurer keeps. The residual 77bp is the illiquidity premium it may lock in by holding to maturity.
- Liability discount rate: 4.50% + 0.77% = **5.27%**. BEL without MA: £58.97. BEL with MA: **£53.99**. The MA lowers the BEL by £4.98, or **8.4%** — duration 12 × 77bp less convexity.
- Under the PRA's preferred 2022 calibration (FS 65bp, MA 57bp) the BEL is £55.24 and the benefit a third smaller [B47]. That 20bp was the 2022–23 fundamental-spread argument between the PRA and the industry; HMT sided with the industry, and Woods drew the line: "If Parliament agrees to calibrate the fundamental spread in a certain way ... it would be wrong for us to reverse that through the back door" [B26][B45].
- Scale: ~8% of c.£300bn of BPA technical provisions is in the region of the £37bn own-funds uplift the PRA measured at end-2020 [B19][B34].
- Price: the scheme values the same cash flow at gilts flat (gilt 4.7%: PV £57.63). The insurer's BEL is £53.99; add a small post-2023 risk margin, SCR of perhaps 10–12% of BEL, and a 14–18% IRR hurdle on that capital, and the insurer can still bid below £57.63 — "gilts + 0.2%" [B31][B32][B5].

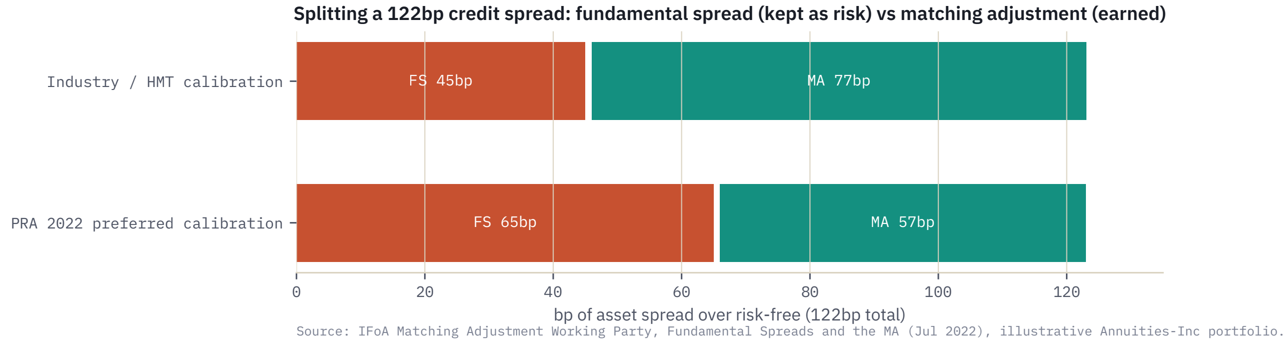


Figure 6 — Splitting a 122bp spread into fundamental spread and matching adjustment under the two 2022 calibrations. Source: IFoA MA Working Party [B47].

What Solvency UK changed, in order. HMT's November 2022 response set the shape; the PRA wrote the rules [B26]. (1) Risk margin: cost-of-capital rate 6% → 4% with a life tapering factor of 0.9 (floor 0.25), a cut HMT described as 65% for life insurers, in force 31 December 2023; Aviva and Just each attributed +6–7 points of coverage to it [B26][B25][B37]. (2) MA reform, in force 30 June 2024 (PS10/24): "highly predictable" cash flows admitted but "limited in aggregate to creating 10% of the MA benefit for the MA portfolio"; the sub-investment-grade cap removed; a notched FS from 31 December 2024; and an annual senior-manager attestation that the FS reflects compensation for all retained risks and that the MA can be earned "with a high degree of confidence" — the first attestations fell due at year-end 2024 [B23][B28]. (3) The MA Investment Accelerator (27 October 2025): firms may self-certify new asset types into the MA portfolio up to the lower of 5% of MA BEL and £2bn, regularised within 24 months [B24]. (4) Housekeeping: PS18/26 (July 2026) moves MA reporting to XBRL from year-end 2026 [B39]. The quid pro quo was the industry's pledge to invest £100bn in UK productive assets over ten years; annuity providers put £10.9bn into primary issuance in 2024, 63% of it private or unlisted [A60].

The asset side is 60/40, and the 40 is the point. Gareth Truran (April 2026): MA portfolios are "around 60% ... sovereign and corporate bonds" and "40% composed of illiquid or non-traded assets" (infrastructure debt, secured residential and commercial property lending, equity release mortgages); ~40% of assets are rated CQS0–1, "less than 1% ... sub-investment grade", and one-third are internally rated [A1]. Corporate bonds and gilts were 55% of annuity-backing assets at end-2020 and 52% at end-2022 [B35]. "For a number of firms, the largest asset class concentration is in ERMs, which on average accounts for 16% of the MA portfolio asset value" [B7]; ERMs must pass the PRA's Effective Value Test at a minimum deferment rate of 4.5% and property volatility of 13% [A53]. KPMG's year-end 2025 compilation puts IFRS 17 illiquidity premia in annuity discount rates at 133–200bp across the large writers [A25]. This is what "productive finance" means in practice: the MA rewards assets with fixed, long, spread-bearing cash flows, and the PRA's supervisory worry is that a third of them are rated in-house.

Derivatives inside the MA portfolio are allowed, but on the PRA's terms. SS7/18: firms should "only ... use derivative instruments where they genuinely contribute to a reduction in risk or facilitate efficient portfolio management"; it contemplates pairing foreign-currency bonds with "longer-dated cross currency swaps", rejects FX forwards because their cash flows "are only contractually fixed for a few months", requires robust collateral and counterparty standards, and forbids gearing the portfolio with cash collateral [D43]. PIC's liabilities "are hedged (on a solvency basis) for interest rate, inflation and currency exposure using derivatives and other assets" [A64]. The BIS notes that "interest rate swaps remain the dominant instrument" and that 2022's rate rise produced mark-to-market swap losses "around 1–2% of total assets at sector level" [A70]. The insurer analogue of the LDI lesson is now arriving as reporting: PS15/25 creates monthly cash-flow mismatch templates that explicitly capture "contingent liquidity demands including derivative margin obligations", daily in stress, for solo firms with more than £20bn of assets and either £10bn of derivative notional or £1bn of repo — every BPA writer — live 30 September 2026, with the PRA citing "the September 2022 liability-driven investment (LDI) crisis" directly [E12]. In the SWES, insurers met "around 30% of their IM and VM calls using corporate bond collateral" under bilateral CSAs — a facility LDI funds do not have [A40].

LIST 2025 was the first stress test with named results. Eleven BPA writers covering more than 90% of annuity liabilities; a 1-in-100 core scenario; aggregate coverage from 185% to 154%, surplus from £30.5bn to £21.9bn (own funds −6%, SCR +13%); £12.9bn of assets downgraded to sub-investment grade; a funded-reinsurance recapture of £12.3bn (about half the sector's exposure) costing a further 10 points, to 144%; an asset-concentration scenario costing 1 point; "not a pass-fail exercise" and "all firms continue to meet their regulatory capital requirements" [B7] [B8] [E9]. Firm results ranged from Rothesay (264% → 213%) and PIC (236% → 184%) to Partnership (183% → 112%) and Prudential Assurance (157% → 122%) [B8]. The next exercise launches in January 2028, with scope and methodology due in Q4 2026 [E10].

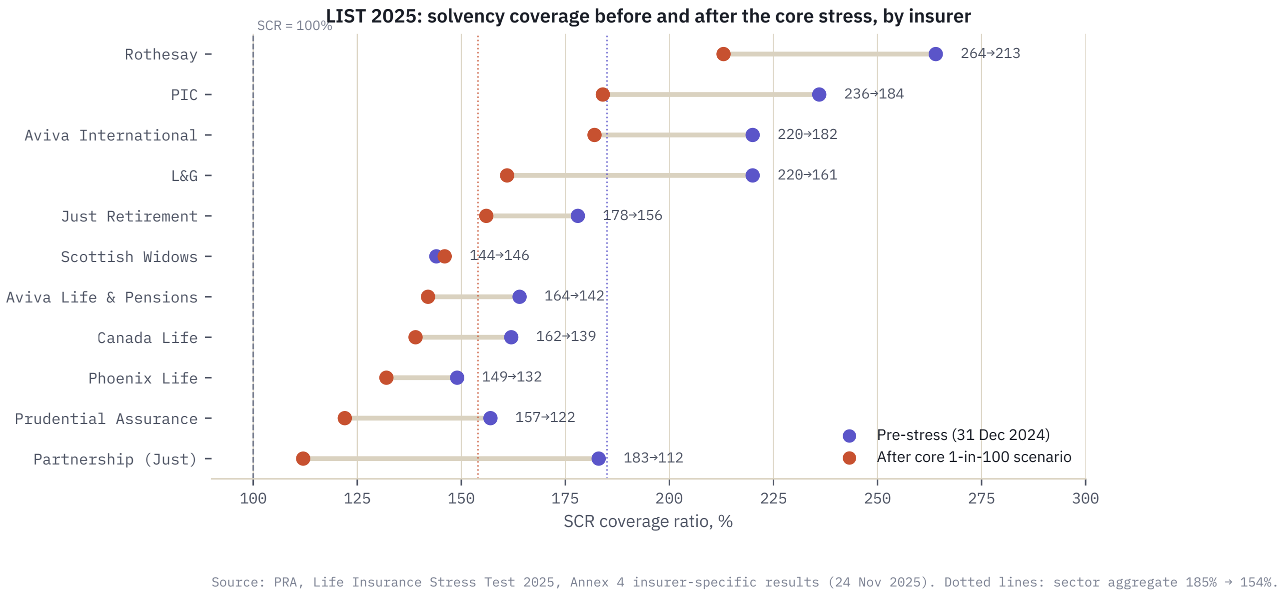


Figure 7 — LIST 2025 insurer-specific results, pre-stress and after the core scenario. Source: PRA Annex 4 [B8].

07

Bulk annuities: pricing, volumes, funded reinsurance and longevity

A buy-in is a fully collateralised, longevity-indexed, inflation-linked amortising swap written by a regulated insurer with the premium paid up front. The trustees pay a premium; the insurer pays the scheme cash flows that exactly match the insured members' benefits — indexed, with spouses' reversions — for life. The scheme remains liable to members and holds the policy as an asset; the insurer takes rates, inflation, credit, longevity and expense risk on that tranche. A buy-out converts the policy to individual annuities and discharges the trustees. Three product variants matter to a derivatives reader: level annuities (pure rates and credit plus longevity); RPI/CPI-linked annuities (inflation-linked cash flows, hedged with index-linked gilts and inflation swaps); and LPI annuities — "RPI with a cap of 5% and a floor of 0% applying each year", which "often represents the largest portion of liabilities" — economically an inflation swap plus a short cap and a long floor, a strip of year-on-year inflation options [A71]. The LPI swap market "is exceptionally illiquid", so insurers split the cash flows into fixed and inflation-linked components and delta-hedge, some dynamically [A71][D40]. When RPI ran above 5% in 2022–23 the liability stopped indexing and the hedge over-performed; near zero the floor bites.

Pricing is quoted against gilts, and it has been below them. The insurer projects best-estimate cash flows on its own (usually lighter) mortality basis, discounts at SONIA plus the spread it expects to earn net of the fundamental spread, and loads expenses and a return on the capital it must hold. Consultants express the result as an implied return relative to gilts: LCP's chart shows full buy-in pricing "expressed as an implied return compared to the yield available from holding gilts", and "where buy-in pricing is above the zero line, a pension scheme can typically increase its expected investment returns by exchanging gilts for a buy-in" — around +0.1–0.3% a year through 2025 and +0.3–0.4% in Q1 2026, against about −0.1% in March 2021 [B5][A29]. Truran: "BPA pricing reached historically low levels in 2025" [B17]. Hymans adds a market-structure point: the 15-year gilt-swap spread "widened significantly post-2024", making "investing for the gilt-swap spread more beneficial than the part of the credit spread insurers can allow for" — insurers were buying gilts and US Treasuries on repo, not just credit [B11]. The PRA's January 2026 priorities letter: "We remain concerned that competitive pressures create incentives for firms to weaken pricing discipline or their risk management standards" [B27]. New-business strain — capital consumed at inception — ran 2–3% in 2025 versus ~1% in 2024; Aviva reports IRRs of 18% and a "disciplined approach to pricing in a competitive market"; L&G a 14% minimum hurdle [A3][B32][B31].

Volumes settled at £40–50bn, then dipped on size while the count kept rising. Hymans' annual series: £3.7bn (2009), £11.0bn (2014), £24.2bn (2018), £43.6bn (2019), £31.4bn (2020), £27.7bn (2021), £28.0bn (2022), £49.1bn (2023), £47.8bn (2024) [B12]. 2025: "a record 370 buy-ins took place, covering £38bn of premium", the count up more than 20% "driven almost entirely by an increased number of buy-ins worth less than £100m" and volume down more than 20% as fewer multi-billion deals transacted [B10]. Counts by source for 2025: LCP 367, Hymans 370, Rothesay 374, the PRA 354 — the difference is whether umbrella-contract tranches are aggregated [A28][B10][B38][B17]. H1 2026 was slow on volume — XPS "below £10bn", Aon "expected to exceed £10bn", L&G £2.0bn across 11 schemes, Aviva £1.1bn — against January forecasts of £40–55bn (LCP), ">£50bn for the first time" (Hymans) and £70bn including swaps (WTW); Standard Life now guides £35–40bn for the year and expects "the return of larger schemes" in H2 [B3][B30][B31][B32][B1][B11][B16][B33]. Record deals: British Steel £7.5bn (L&G) and RSA £6.5bn (PIC) in 2023; NatWest £6.1bn and £3.6bn (Rothesay) in 2024; Ford £4.6bn (L&G) and Rolls-Royce £4.3bn (PIC) in 2025 [B13][B12][B11]. Capacity narratives: LCP's central decade projection is £350–550bn, "over

£1trn" if 2020 gilt yields returned; insurer stated appetite is £40bn a year baseline "up to £70bn at current pricing levels"; PIC forecasts £400–600bn over the decade [B5][A3].

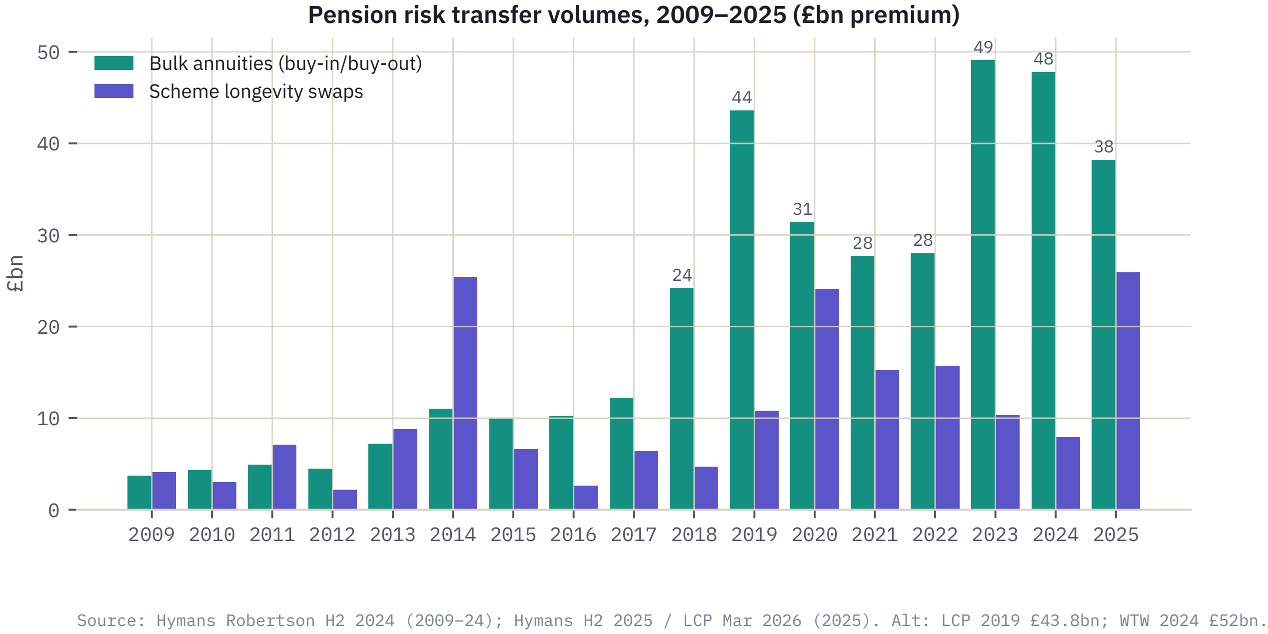


Figure 8 — Bulk annuity and longevity-swap volumes, 2009–2025. Source: Hymans Robertson series; 2025 from Hymans/LCP [B12][B10][A28].

Longevity leaves the insurer almost as fast as it arrives. PIC: "89% of PIC's total longevity risk had been reinsured (FY2024: 82%) across our panel of 14 global insurers", £7.8bn ceded in 2025 [A64]. Rothesay: "91% of our longevity exposure is reinsured", £6bn via unfunded collateralised longevity swaps in 2025 [A15]. A longevity swap exchanges fixed payments (expected cash flows plus a fee) for floating (actual cash flows as members live or die); no premium changes hands and it is collateralised like a swap [A15]. Schemes also trade them directly, often through a trustee-owned captive fronting a reinsurer — 2025 was a record at £25.9bn of UK scheme swaps (BT £5.0bn with Swiss Re, BBC £6.0bn, Lloyds Banking Group £6.1bn across three deals); Hymans counts 72 swaps and £176bn since 2009 [A28][A35][A62]. The retained risk for a UK annuity writer is therefore predominantly credit spread and asset-liability mismatch, not mortality. The assumptions themselves are moving: CMI_2025 (March 2026) adds about eight weeks (males) and six weeks (females) of cohort life expectancy at 65 after "all-age mortality in 2025 was the lowest on record" [A66].

Funded reinsurance is where the capital arbitrage lives, and the PRA has moved against it. SS5/24 defines funded re as "a form of collateralised quota share reinsurance contract which transfers part or all of the asset and liability risks associated with a portfolio of annuities to a counterparty" [A43]. The UK insurer writes the BPA, then cedes a block — premium and liabilities — to a reinsurer, often Bermuda-domiciled and affiliated with a private-credit manager, which posts collateral into a custodian account in the cedant's jurisdiction; economically the cedant has swapped a spread-earning annuity book for a total-return swap on it with the reinsurer's credit as counterparty [B20][A68]. The numbers: exposure "approximately £40 billion" at end-2024, "c.£110 billion" projected absent policy change; ~15% of new BPA ceded; £6.5bn of premiums in 2025; capital held "only around 2-4% of liabilities, compared to 11-15% for similar investments" [B19]

[B17]. Firms differ: L&G's funded-re premiums went from £557m (2024) to £2,208m (2025); Rothesay "has not utilised any funded reinsurance"; Just did none in 2025 [A5][A15][A3]. The supervisory concerns, in the PRA's words: contracts "collateralised at less than 100% of initial premium", "large permissible duration mismatches", "strong 'wrong way' risk", collateral that is "private, complex and untraded", counterparties with "similar credit focused business models, which might be correlated to each other and to broader credit conditions", and a regime that "treats it as essentially a risk-free construct" [B22][B48][B19][A44]. **Recapture** is the failure mode: the treaty terminates, the cedant takes the collateral back onto its own balance sheet, must re-establish MA compliance and re-hedge on a sub-optimal portfolio in a stressed market — SS5/24 presumes recaptured assets sit outside the MA portfolio unless proven otherwise, and LIST 2025 priced half the sector's exposure at 10 points of coverage and c.£3bn of surplus [B21][B7][B19].

CP8/26 changes the arithmetic from 1 July 2027. The proposal: a prescribed counterparty default adjustment "equal to the FS for financial corporate bonds" at the reinsurer's notched credit quality step, up to three notches better for collateral quality, unrated counterparties defaulting to BBB–, "irrespective of whether the reinsurer is authorised in an 'equivalent' jurisdiction, such as Bermuda", and without credit for the reinsurer's own regulatory capital [B19][B20][E5]. Effect: the 2–4% "would rise to something more like 10%", c.£700m of extra initial capital a year at unchanged usage [B17][E1]. Grandfathering only for arrangements "where all the risks covered have been fully transferred to the reinsurer on or before 30 September 2026"; consultation closed 31 July 2026; no policy statement had appeared by the date of this note; the PRA "may still consider introducing volume limits, depending on the outcome of the 2028 life insurance stress test" [E1][E3]. Sam Woods: "Funded reinsurance is growing rapidly and has the potential to undermine the resilience of insurers if not managed properly. Today's proposals aim to iron out the discrepancy in the regulatory treatment for these deals, to protect pensioners and improve insurers' incentives to invest directly in the UK economy" [B18]. LCP's read for trustees: "Lower usage of Funded Reinsurance in future has the potential to negatively impact pricing and/or reduce capacity for some insurers" [B5].

The endgame debate is no longer buy-out versus deficit; it is buy-out versus run-on. With 74% of schemes in s179 surplus, 80% in surplus on TPR's low-dependency basis and 60% on buy-out at end-2025, the Pension Schemes Act 2026 lowers the surplus-release threshold from buy-out to low-dependency funding (regulations in force Q2 2027), with the government citing £160bn of accessible surplus [B36][E29][B43][E27]. Rothesay finds "approximately one-third of schemes expecting to run-on for a period" [B38]. For hedging demand that means continued but lower-leverage LDI books funded from physical gilts, less BPA-driven swap demand than the 2023–25 pipeline implied, and trustee interest in run-on hedging of inflation and longevity. Superfunds remain marginal — Clara's six deals total under £1.6bn against a £38bn-a-year insurance market — until the statutory regime arrives in 2028 [B44][E27].

08

Bilateral trading: documentation, collateral, clearing and repo

Everything a scheme or insurer does with a dealer sits under two master agreements and one annex. The ISDA Master Agreement (1992 or 2002 form) makes all OTC trades between two parties a single agreement, so that on default everything nets to one close-out number; the 2002 form tightened close-out valuation and shortened grace periods [D45]. The Credit Support Annex (CSA) is the collateral schedule; under English law it is title-transfer — collateral becomes the taker's property against an obligation to return equivalent assets. Its dials are the *threshold* (unsecured exposure allowed before any call; zero under regulatory VM), the *minimum transfer amount* (regulatory cap €500k), the *independent amount* (pre-2016 contractual initial margin), *eligible collateral* and *valuation percentages* (haircuts: 100% cash, typically 95–98% gilts by maturity), one-way versus two-way posting, and the rate paid on cash collateral (SONIA), which becomes the trade's discount rate — "the type of collateral that you exchange periodically ... will define the discounting of your cashflows and hence the valuation of the portfolio" [D46]. The 2016 VM CSA is the regulatory form: zero threshold, daily calculation, T+1 settlement [D45]. Repo sits under the GMRA (ICMA/SIFMA; 1992, 1995, 2000, 2011 versions): title transfer, daily re-margining, close-out netting; an LDI fund will typically hold GMRAs with six to twelve dealers to diversify roll risk [D47].

Margin rules apply to both as financial counterparties; clearing applies to insurers but not to pension schemes. Mandatory VM has applied since 2017. Regulatory IM applies where a group's average aggregate notional of uncleared OTC derivatives (AANA, measured March–May) exceeds €8bn — the sixth and final phase, 1 September 2022 — with a €50m threshold per group pair below which IM is documented but not exchanged; the UK rules retain the euro amounts [D7][D8][D9]. IM is posted gross by both sides, segregated at a tri-party or third-party custodian, and cannot be re-used; ISDA SIMM (10-day 99%, recalibrated twice a year, 426 licensed groups) is the model, and the standard grid would demand about 2.8 times as much [D9][D11]. PS23/25 (27 November 2025) made the equity-option IM exemption permanent and lets counterparties whose AANA drops below €8bn stop exchanging IM at year-end [D12]. The UK pension-scheme clearing exemption — created in EMIR in 2012, extended repeatedly, carried into UK EMIR and due to lapse on 18 June 2025 — was made indefinite by SI 2025/670 after HM Treasury's January 2025 conclusion that "the exemption should be maintained for the longer-term"; the explanatory memorandum's reason is the one that matters: "there is no widely accepted means by which pension funds are able to provide collateral as variation margin when clearing derivatives without having an adverse effect on the retirement benefits of future pensioners" [D2][D3]. Of 26 respondents 17 wanted it permanent; "every respondent who commented on the issue noted that CCPs have a strict requirement to post cash as variation margin", and gilts are "the most used form" of non-cash VM bilaterally [D3]. The EU let its exemption expire in June 2023 and then built a bridge: EMIR 3 lets EU dealers trade uncleared with third-country schemes that have a home exemption [D1][D5]. Insurers and LDI funds (as AIFs) are subject to the clearing obligation for mandated classes, though many clear voluntarily anyway.

At the CCP, VM is cash, and the CCP is not softening. LCH: "The importance of VM in cash for cleared swaps remains a core foundational principle" [D14]. Its April 2026 circular adds "a 25%

minimum cash requirement" for house-account margin across LCH Ltd services from July 2026, because it observed "a material reduction in cash collateral as a proportion of total margin" — client accounts excluded, but the direction is unmistakable [D15]. No evidence was found of LCH accepting gilts as VM (Caveats). The scale of the problem in 2022: client IM on a £100m 10-year receive-fixed SONIA swap went from £4.5m on 1 August 2022 to £9m in October [D16]. ISDA's year-end 2025 survey gives the uncleared picture: phase-one firms collected $1.6trn of IM and VM; non-cash was 51.7% of all collateral received for non-cleared derivatives, 89.8% of IM and 32.4% of VM, "concentrated in government securities" [D13].

Cleared versus bilateral, from the asset-rich, cash-poor side. A receive-fixed hedger owes VM when yields rise — exactly when its gilts have fallen and repo haircuts are rising. Cleared, it must hold a cash buffer (drag), repo gilts for cash (dealer balance sheet, itself constrained by the leverage ratio and procyclical haircuts), or sell. Bilaterally under a two-way zero-threshold CSA that accepts gilts, the fund delivers what it owns and the dealer bears the cost of transforming gilts into the cash VM its own cleared hedge requires — the pension fund's liquidity problem reappears on the dealer's balance sheet as repo usage and leverage exposure. Sponsored clearing at LCH RepoClear lets a bank "sponsor buy-side direct access to the CCP" so repo nets at the CCP rather than gross on the dealer's balance sheet [D50]. The BoE's April 2026 feedback statement reports that respondents "consistently opposed the introduction of a market-wide clearing mandate" and "were not supportive of an introduction of non-risk-sensitive minimum haircuts", and points to incentives — cross-product margining, wider collateral eligibility — rather than mandates, with proposals due in early 2027 [D18].

Gilt repo is the liquidity engine, and it is mostly uncleared, dealer-intermediated and zero-haircut. Bank data for 2025 Q1: daily volumes about £250bn and about £935bn outstanding; 23% of the gross stock centrally cleared, almost all under three months; dealer-to-client about 65% of the stock; hedge funds about 16% of gross outstanding, DB schemes and LDI funds about 8%; "more than half of the outstanding stock in the non-centrally cleared segment ... was conducted at zero haircuts" [D17]. Comprehensive clearing "could have increased the stock of nettable gilt repo by £75 billion" before March 2020 and "reduced the leverage ratio impact of gilt repo by 40% in aggregate" for the gilt-edged market makers sampled [D17]. The SWES finding is the one to remember when sizing an LDI collateral waterfall: "many underestimate the extent to which their own access to repo may deteriorate in the stress", and haircut increases are made "often to double the size of the original haircut" [D20]. BoE Staff Working Paper 735 found the UK leverage ratio made dealers "16.3 percentage points less likely to be providing clearing services to clients", concentrated in longer-dated derivatives [D34].

09

The price of the relationship: xVA for a reader who knows derivatives but not the plumbing

A dealer's quote is risk-free mid plus bid-offer plus a stack of adjustments, each the present value of a cost that exists only because of who the counterparty is and what the collateral terms say. The family, in the order a pension desk meets it:

- **CVA** — credit valuation adjustment: $LGD \times \Sigma\, EE(t) \cdot PD(t, t+dt) \cdot DF(t)$, the expected loss if the client defaults while owing money. Under a zero-threshold daily CSA, exposure collapses to what can build over the margin period of risk (10 days uncleared, 5 cleared). An unrated pension scheme has no CDS, so PD comes from a proxy spread and the hedge is imperfect.
- **DVA** — the mirror image: the dealer's own default. Recognised in accounts, rarely passed on in price.
- **FVA** — funding valuation adjustment: the cost of funding uncollateralised or asymmetrically collateralised mark-to-market at the dealer's unsecured spread rather than at OIS. Largest under one-way CSAs where the dealer posts but does not receive.
- **ColVA** — collateral valuation adjustment: the rate the collateral earns, the cheapest-to-deliver option across eligible securities and currencies, thresholds and MTAs. Clarus calls securities-eligible CSAs "dirty CSAs" and notes dealers charge for them "as they must essentially run daily repo trades" [D46].
- **MVA** — margin valuation adjustment: the lifetime cost of funding initial margin (CCP IM or SIMM), formalised by Green and Kenyon in 2014; "MVA is significantly larger than the bid/offer spread when we assign a cost of 50 basis points to Initial Margin" [D51][D52].
- **KVA** — capital valuation adjustment: the cost of regulatory capital over the trade's life — counterparty-credit capital on the SA-CCR exposure, CVA capital, leverage-ratio exposure, and for G-SIBs the surcharge. "The magnitude of the KVA can be much greater than the other value adjustments combined" [D53].

The two regulatory formulas that decide most of it. SA-CCR (BCBS 279): $EAD = \alpha \times (RC + PFE)$, $\alpha = 1.4$, and for an interest-rate trade PFE = 0.5% × notional × supervisory duration × maturity factor, where the supervisory duration is $(e^{-0.05S} - e^{-0.05E})/0.05$ — about 15.5 for a 30-year trade — and the maturity factor is 1 unmargined but $1.5 \times \sqrt{MPOR/1y} \approx 0.30$ margined at 10 days [D54]. Long-dated trades are penalised through duration; collateralisation is rewarded through the maturity factor and the replacement cost. BA-CVA (Basel III): the stand-alone charge per counterparty is $(1/\alpha) \times RW \times M \times EAD \times DF(M)$, with a 0.65 discount scalar since the 2020 recalibration; because effective maturity M enters linearly, a 30-year swap carries roughly six times the CVA capital of a five-year one for the same EAD [D28][D55]. The UK specifics: PS17/23 "removed the existing temporary CVA exemption for transactions with pension funds, but introduced a new risk weight that is lower than Basel 3.1 standards" — 3.5% investment-grade, 8.5% unrated or high-yield, versus Basel's 5%/12% for financials — kept legacy trades exempt for five years after implementation, retained the client-clearing exemption, and "reduced the SA-CCR 'alpha factor' from 1.4 to 1 for transactions with pension funds and non-financial counterparties ... reducing the resulting CCR risk-weighted assets by approximately 30%" [D28][D29][D56]. Implementation is 1 January 2027, confirmed by PS1/26, after a one-year delay "to allow more time for greater clarity to emerge about plans for its implementation in the United States" [D31][D32].

Worked example: a 30-year £100m receive-fixed GBP swap under four collateral regimes

All figures from `xva_model.py` (function `xva_example`); **illustrative, my arithmetic, not a market quote.** Assumptions: swap rate 4.5% (annuity ≈ 16.3, PV01 ≈ £163k per basis point — consistent with Clarus's £84–86k on a 10-year £100m [D16]); normal rate volatility 80bp a year; expected exposure $EE(t) \approx 0.4 \cdot \sigma \cdot \sqrt{t} \cdot PV01(t)$, about £10.6m at 5 years, £13.2m at 10, £13.3m at 15, £11.3m at 20 and £7.0m at 25; pension-fund proxy spread 100bp with 60% LGD; dealer funding spread 50bp; cost of capital 10% on standardised capital (CCR at a 10.5% ratio and 100% risk weight, plus BA-CVA); KVA taken as the present value of that cost over the run-off of the capital.

CASE	EXPOSURE MECHANICS	CVA	FVA	KVA (CCR + CVA CAPITAL)	ALL-IN, BP RUNNING OVER M
(a) Two-way zero-threshold CSA, gilts eligible	Exposure limited to the 10-day MPOR: EE ≈ £1.0m	≈ £0.10m, 0.6bp	≈ 0, but a 1–3bp collateral-transformation charge (gilts → cash VM at the CCP)	EAD ≈ £2.3m; capital £1.1m (RW 3.5%) to £2.3m (RW 8.5%); KVA 7–13bp	≈ 8–17
(b) Two-way zero-threshold CSA, cash only	Same credit exposure; no transformation for the dealer; the client carries the cash-buffer drag	0.6bp	≈ 0	as (a)	≈ 7–14
(c) Cleared at LCH via a clearing broker	Dealer faces the CCP; client-clearing exemption retained; client posts IM (≈ £15–25m, scaling from the 10-year £9m of October 2022 [D16]) and cash VM	≈ 0	≈ 0	dealer: leverage-ratio exposure on client IM, default-fund contribution	≈ 0.5–2bp — **plus t client's own IM funding, 5–12bp at 50bp on £15–2**
(d) Uncollateralised / legacy one-way CSA (dealer posts, insurer does not)	Full EE profile above; $\int EE \cdot DF \approx$ £167m·yr	≈ £1.4m, 8.5bp	≈ £0.8m, 5.1bp	EAD ≈ £10.9m; capital £1.1m (CVA-exempt) to £7.8m (RW 8.5%); KVA 8–47bp	≈ 22–61

Reading the table. Collateral terms move a 30-year swap from a couple of basis points to several tens; the exposure term drives CVA and FVA, and the maturity-weighted CVA capital drives KVA — which, at a full 10% cost of capital on standardised capital, is the largest line even under a CSA. Three consequences. First, the UK's 2027 removal of the pension-fund CVA exemption matters most for the residual uncollateralised or high-threshold relationships — mainly legacy one-way insurer CSAs, which the 2017 VM rules already closed to new trades — and the 3.5%/8.5% bucket and $\alpha = 1$ roughly halve the bill relative to Basel. Second, clearing does not make the cost disappear; it moves it from the dealer's capital to the client's initial-margin funding, which is why HM Treasury's respondents were unanimous about cash VM. Third, the empirical anchor — Cenedese, Ranaldo and Vasios's finding on USD swaps that "a client pays the dealer around 8 basis points more for a non-CCP contract than an equivalent CCP one", about 10bp for non-bank clients when the dealer receives fixed, with IM cutting the premium by four to nine basis points, and "CVA and KVA are important drivers of OTC premia" — sits inside the collateralised range for a shorter, deeper market [D33].

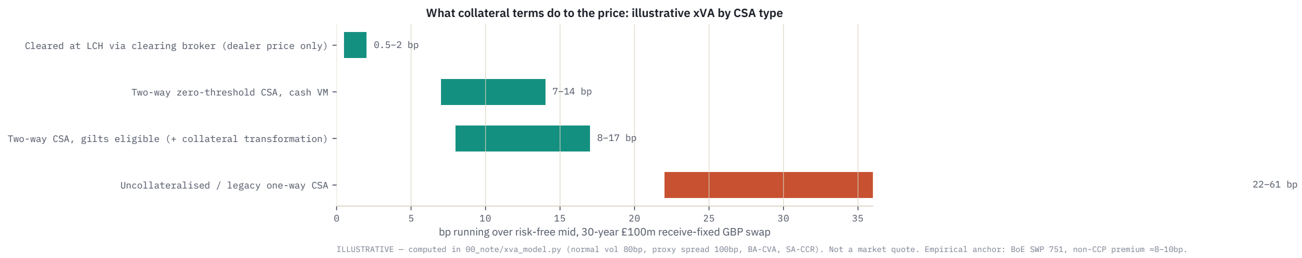


Figure 9 — Illustrative all-in xVA by collateral regime. Source: `xva_model.py`; not a market quote.

Why insurers, unlike schemes, want to be collateralised. Under the Solvency II standard formula a derivative is a type-1 counterparty-default exposure charged as PD × LGD, with LGD = max(90% × (derivative value + risk-mitigating effect) – F''' × collateral; 0): the hedge's risk-reducing effect is itself at risk on counterparty default, and only collateral reduces the charge [D44][D57]. So an uncollateralised swap costs an insurer SCR and a collateralised one barely does; SS7/18 additionally requires robust collateral terms inside the MA portfolio [D43]. Truran notes insurers "have also renegotiated their credit support annexes to allow them to post a wider range of collateral and secure more committed funding lines" [A1] — the insurer response to 2022 was contractual, where the pension response was regulatory.

Product specifics a desk will meet. *Inflation.* RPI will be aligned to CPIH methods from February 2030 — the Chancellor's October 2020 letter: "I will be unable to offer my consent to the implementation of such a proposal before the maturity of the final specific index-linked gilt in 2030" — with no compensation; the High Court dismissed the BT, M&S and Ford schemes' judicial review on 1 September 2022, recording the loss to relevant gilts as "around £90 billion – £100 billion" and declaring that "the RPI will not cease to be published", so gilt cessation clauses are not triggered [D35][D37]. RPI has exceeded CPIH by about 1% a year since 2010, which is what index-linked gilt real yields and long inflation swaps already embed [D38]. *LPI.* LPI swaps are "zero-coupon inflation swaps on capped and floored year-on-year rates" whose value depends on year-on-year smiles and correlations that are not quoted; the market is "exceptionally illiquid" and books are delta-hedged with RPI and nominal swaps [D40][D39]. *Longevity swaps* are documented either as insurance (indemnity) or as capital-markets derivatives under an ISDA Master with a CSA, with "experience collateral" and "fee collateral" held in segregated tri-party accounts [D41][D42]. *Cross-currency.* MA portfolios hold non-sterling credit paired with long-dated cross-currency swaps; the PRA accepts the structure and rejects rolling FX forwards [D43]. No primary source quantifies UK insurers' cross-currency books (Caveats).

10

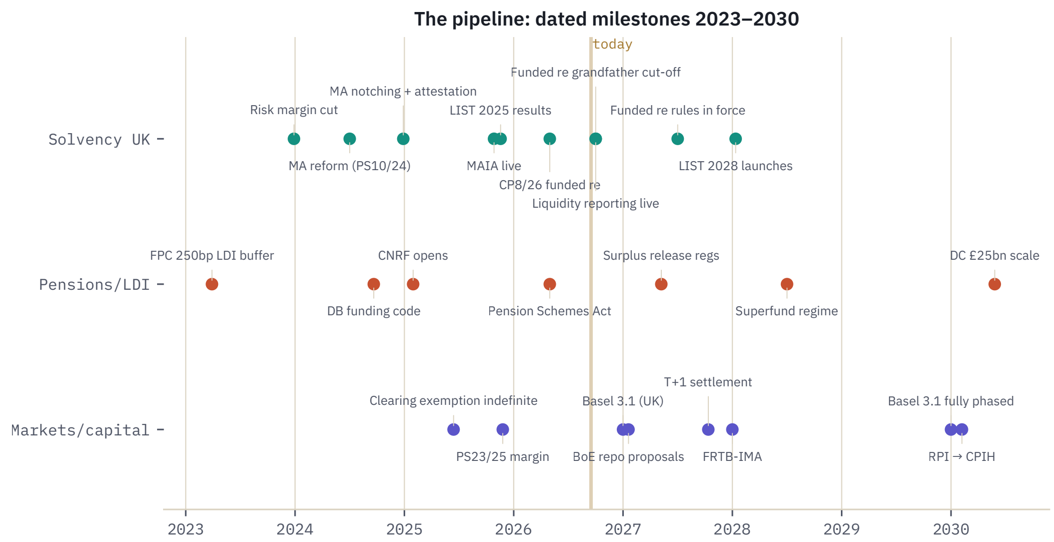
The pipeline: what is dated, what is consulting, what to watch

Solvency UK is built; the PRA has moved from rule-writing to tightening the one growth channel it distrusts. The reform sequence is complete — risk margin (31 December 2023), MA reform (30 June 2024), notching and attestation (31 December 2024), MAIA (27 October 2025), reporting tidy-up (PS18/26, year-end 2026) [E17][E16][E15][E13]. The live items are funded reinsurance (CP8/26: rules 1 July 2027, grandfathering line 30 September 2026, policy statement pending), liquidity reporting (30 September 2026), the alternative-life-capital discussion (DP2/25 on sidecars, ISPVs and SRTs, feeding 2026 policy design), a captive regime consultation "later in 2026", and LIST 2028 (launch January 2028; scope in Q4 2026) [E1][E12][E19][E6][E10]. The PRA's 2026 priorities letter names BPA pricing discipline, solvency-triggered termination rights in BPA contracts, private-credit internal ratings and internal models with "material differences in actual and assumed profitability" [E7][E8].

Pensions: the Act is law and the secondary legislation is dated to 2035. The Pension Schemes Act 2026 (Royal Assent 29 April 2026) contains DB surplus release at a threshold to be set in regulations (expected low-dependency), a statutory superfund regime, a £25bn DC "main scale" default by 2030, Value for Money, small-pot consolidation, guided retirement, LGPS pooling, PPF levy flexibility, and a reserve power to mandate DC default allocations (up to 10% "qualifying assets", 5% UK) exercisable only after 1 January 2028 and lapsing if unused by end-2032 [E23][E25][E26]. The DWP roadmap (14 July 2026): surplus regulations in force Q2 2027 alongside HMRC's direct-payments regime; VfM Q1 2027 with first assessments in 2028; superfund regulations consulted Q1 2027 and in force during 2028; scale threshold and small pots from Q2 2030 [E27]. TPR's Annual Funding Statement (May 2026): 90% of schemes in surplus on technical provisions, 80% on low dependency, 60% on buy-out; the PPF charged a zero conventional levy for 2026/27, its second zero year, with £14bn of reserves [E29][E30]. Tax: inheritance tax on unused pensions from 6 April 2027; a £2,000 salary-sacrifice NIC cap from 6 April 2029 [E32].

Markets and central bank: the amplifier has moved to hedge-fund repo, and policy is following it. The Bank's gilt-repo track promises "a comprehensive update, including potential policy proposals, in early 2027" on risk-sensitive minimum haircuts and clearing incentives [E41]. The FPC has lowered its system-wide Tier 1 benchmark to about 13% of RWA and intends to consult on removing the countercyclical leverage buffer and making leverage buffers releasable — aimed squarely at dealer gilt-intermediation capacity in stress [E36]. QT runs at £70bn for October 2025–September 2026 to £488bn, with the Bank aiming "to sell fewer long maturity sector gilts than gilts at other maturities"; the next annual decision is due at the 17 September 2026 MPC [E49][E51]. The private-markets SWES (46 participants; scenario published 19 June 2026) reports interim findings later in 2026 and finally in 2027 [E43]. The DMO's long-conventional share is 9.1%; the 30-year yield hit 5.78% on 5 May 2026 and a 30-year auction on 8 September 2026 cleared at a record 5.8168% [E47][E52][E53].

Bank capital and market structure: the dates a dealer's pricing will change. Basel 3.1: 1 January 2027 (PS1/26), FRTB internal models 1 January 2028, output floor fully phased 1 January 2030; the pension-fund CVA bucket (3.5%/8.5%) and SA-CCR α = 1 survive; the US re-proposed its own endgame on 19 March 2026 on a "capital-neutral" basis [E55][E56][E57][E58]. UK EMIR: clearing exemption indefinite; PS23/25 margin relaxations; reporting amendments in force 26 January 2026; T+1 settlement on 11 October 2027, which tightens collateral mobilisation around margin calls [E59][E62][E63][E64]. RPI to CPIH in February 2030 [E54].



Sources: PRA CP8/26, PS10/24, PS17/25, PS15/25, LIST 2028 statement; DWP roadmap 14 Jul 2026; SI 2025/670; PS1/26; FCA T+1; UKSA RPI decision.

Figure 10 — Dated milestones, 2023–2030. Sources as listed in register E.

DATE	ITEM	REGULATOR	STATUS
17 Sep 2026	MPC: annual QT decision for Oct 2026–Sep 2027	BoE	scheduled [E51]
30 Sep 2026	Insurer liquidity reporting (PS15/25) goes live	PRA	scheduled [E12]
30 Sep 2026	CP8/26 grandfathering cut-off for funded re fully transferred	PRA	proposed [E1]
28 Oct 2026	Autumn Budget (date per press; unconfirmed on gov.uk)	HMT	expected [E53]
31 Oct 2026	Pensions dashboards connection deadline	DWP/PDP	scheduled [E65]
Q4 2026	LIST 2028 scope and firms	PRA	expected [E10]
Late 2026	Captive regime consultation; DyGIST findings; private-markets SWES interim	PRA/BoE	expected [E6] [E11] [E43]
31 Dec 2026	PS18/26 reporting changes effective	PRA	scheduled [E13]
1 Jan 2027	Basel 3.1 implementation (UK)	PRA	scheduled [E55] [E56]
Early 2027	BoE gilt-repo policy proposals (haircuts, clearing)	BoE	expected [E41]
Q1 2027	VfM regulations; superfund draft regulations consultation	DWP/FCA	scheduled [E27]
6 Apr 2027	IHT on unused pensions	HMRC	scheduled [E32]
Q2 2027	DB surplus-release regulations in force	DWP/HMRC	scheduled [E27]
1 Jul 2027	CP8/26 funded reinsurance rules in force	PRA	proposed [E1]
11 Oct 2027	T+1 settlement (UK, EU, CH)	HMT/FCA	scheduled [E64]

DATE	ITEM	REGULATOR	STATUS
1 Jan 2028	FRTB-IMA; earliest exercise of DC mandation reserve power	PRA / DWP	scheduled [E56][E26]
Jan 2028	LIST 2028 launches (possible trigger for funded-re volume limits)	PRA	scheduled [E10][E3]
2028	Superfund regulations and TPR code in force; first VfM assessments	DWP/TPR	scheduled [E27]
6 Apr 2029	£2,000 salary-sacrifice NIC cap	HMRC	scheduled [E32]
1 Jan 2030	Basel 3.1 output floor fully phased in	PRA	scheduled [E55]
Feb 2030	RPI aligned to CPIH; no compensation	UKSA/HMT	scheduled [E54]
Q2 2030	DC £25bn scale threshold; small-pot consolidation	DWP	scheduled [E27]

What to watch, and why, from the product desk.

The funded-re deal rush and what replaces it. Anything not fully transferred by 30 September 2026 loses grandfathering. Expect a bulge of cessions before the line, then a shift to higher-rated, better-collateralised counterparties or to direct UK balance sheets — where the asset must be MA-eligible and hedged in sterling. That is more long fixed-rate and inflation-linked sterling collateral, and more cross-currency swap demand if the assets are non-sterling [E1][E5][B20].

Insurer liquidity reporting. From 30 September insurers manage contingent derivative margin as a reported metric. Watch for renegotiated CSAs (wider eligible collateral, committed facilities) and appetite shifts between cleared and uncleared [E12][A1].

The repo policy. Minimum haircuts and clearing incentives raise the cost of the gilt basis and relative-value trades that replaced LDI as the long end's marginal buyer; long-end liquidity in stress becomes a policy variable. The Bank's July 2026 numbers — £85bn of net hedge-fund repo borrowing, 60% of cash volumes, half of bilateral haircuts at zero — are the case [E39][E41].

Surplus release versus buy-out. If run-on takes hold, the 2023–25 BPA pipeline over-states future swap demand from insurers and under-states run-on hedging of inflation and longevity by trustees. TPR's late-2026 guidance consultations and the Q2 2027 regulations are the dates [E28][E27].

The next LDI test is not an LDI test. The FPC's 250bp steady state is binding, and every live episode since has passed. The failure mode to model now is the SWES one — dealers refusing repo, haircuts doubling — for which the CNRF (two participants, never activated) is the backstop [C22][D23].

RPI 2030 basis. Schemes with RPI-linked benefits and CPIH-linked assets from 2030 carry basis; index-linked gilt real yields and long inflation swaps already embed the ~1% wedge, and there is no compensation [D35][D38].

11

Glossary

TERM	ONE-LINE DEFINITION
AANA	Average aggregate notional amount of uncleared OTC derivatives (March–May) that determines IM scope; €8bn since September 2022.
BA-CVA / SA-CVA	Basic and standardised approaches for CVA capital under Basel III/3.1; effective maturity enters BA-CVA linearly.
BEL	Best estimate liability: expected cash flows discounted at risk-free plus (for annuities) the matching adjustment.
BPA	Bulk purchase annuity: an insurer's contract to pay a DB scheme's benefits for a single premium (buy-in or buy-out).
Buy-in / buy-out	Buy-in: the scheme holds the policy as an asset. Buy-out: members become the insurer's policyholders and the scheme winds up.
CNRF	Bank of England Contingent NBFI Repo Facility: cash against gilts for insurers, DB schemes and LDI funds in severe gilt stress.
ColVA	Collateral valuation adjustment: the value of collateral rate, cheapest-to-deliver optionality and CSA terms.
CSA	Credit Support Annex to the ISDA Master: threshold, MTA, eligible collateral, haircuts, one-way or two-way.
CVA / DVA	Credit (debit) valuation adjustment: expected loss from counterparty (own) default on positive exposure.
Funded reinsurance	Collateralised quota-share reinsurance transferring asset and liability risk on a block of annuities, often to Bermuda.
Fundamental spread (FS)	The part of an asset's spread the PRA deems compensation for retained default and downgrade risk; the MA is the rest.
FVA	Funding valuation adjustment: cost of funding uncollateralised exposure above OIS.
GMRA	Global Master Repurchase Agreement: the repo master (title transfer, daily margin, close-out netting).
Hedge ratio	Share of a liability's interest-rate (or inflation) sensitivity removed by the hedge, on a stated liability basis.
KVA	Capital valuation adjustment: lifetime cost of regulatory capital (CCR, CVA, leverage) held against the trade.
LDI	Liability-driven investment: hedging DB liabilities with gilts, repo and swaps, usually with leverage.
LIST	The PRA's Life Insurance Stress Test (2022, 2025; next 2028).
Low dependency	TPR funding basis (roughly gilts + 0.5%) at which a scheme needs no further sponsor support.
LPI	Limited price indexation: RPI capped (usually 5%) and floored (0%) each year — a strip of inflation options.
MA / MAIA	Matching adjustment; MA Investment Accelerator (self-certified MA assets up to min(5% BEL, £2bn)).
MPOR	Margin period of risk: days assumed between last margin and close-out (10 uncleared, 5 cleared).
MVA	Margin valuation adjustment: lifetime cost of funding initial margin.
Own funds / SCR	Assets minus technical provisions; the 1-in-200 one-year capital requirement. Coverage = own funds / SCR.

TERM	ONE-LINE DEFINITION
PPF s179	The PPF's valuation basis approximating the cost of PPF-level compensation; the levy and Purple Book basis.
Pooled / segregated LDI	Multi-investor limited-recourse fund (Ireland/Luxembourg) versus a scheme's own mandate with recourse to its wider assets.
Recapture	Termination of a funded-re treaty returning liabilities and collateral to the cedant.
Risk margin	Cost-of-capital allowance for non-hedgeable risk added to the BEL; cut ~65% for life in December 2023.
SA-CCR	Standardised counterparty credit risk exposure: EAD = α (RC + PFE); α = 1 for UK pension funds from 2027.
SIMM	ISDA's standard initial margin model (10-day 99%).
SWES	The Bank's System-Wide Exploratory Scenario (final report November 2024).
TMTP	Transitional measure on technical provisions: the Solvency I → II step-change, running off to 2032.
UMR	Uncleared margin rules: mandatory VM (2017) and phased IM (2016–2022).
Yield buffer	Yield rise a leveraged LDI fund can absorb before its capital is exhausted; FPC minimum 250bp, CBI/CSSF 300bp.

12

Sources and reproducibility

How the evidence is organised. Five evidence files in `02_research/` — A (market structure), B (bulk annuities and Solvency UK), C (LDI and the 2022 crisis), D (bilateral trading and xVA), E (the regulatory pipeline) — each carry a numbered source register with URL, publisher, date and what the document evidences, a numbers table with a VERIFIED/REPORTED status on every figure, verbatim quotes, and a GAPS section listing what was looked for and not found. Citation tags in this note, such as [C3] or [E27], point into those registers, which are reproduced in full below. The primary documents that carry the argument: the Bank of England's FSR December 2022 and the Cunliffe letters of 5 and 18 October 2022 (the crisis quantities); the SWES final report (November 2024); the FPC record of March 2023 and TPR's April 2023 guidance (the buffer regime); PRA SS7/18, the 2022 MA/FS paper, PS10/24, PS17/25 and LIST 2025 (the insurer regime); CP8/26 and SS5/24 (funded re); HM Treasury's SI 2025/670 explanatory memorandum and PS17/23 (clearing and capital); the DWP roadmap of July 2026 and the DMO's 2026-27 remit.

Reproducing the numbers.

```
python3 tools/boe_glc.py        # rebuilds 01_data/boe_glc_spot_selected.csv from the BoE GLC zips (Part
python3 00_note/xva_model.py    # the three worked examples: MA (Part 5), leveraged LDI (Part 3), xVA (Pa
python3 00_note/charts.py       # all figures, dark and paper variants, from 01_data/series.py and the CS
python3 tools/md2bzh.py         # the note -> HTML -> PDF; also writes site/index.html
python3 tools/build_register.py # UK_insurance_LDI_source_register.xlsx from the evidence files
python3 tools/registers.py      # checks that every citation tag in the note resolves
```

`01_data/series.py` holds every hand-transcribed series with its source line; `UK_insurance_LDI_source_register.xlsx` holds the Documents, Numbers, Claims and Gaps sheets.

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Caveats

The three worked examples are illustrative arithmetic, not models. The MA example is a single cash flow at a flat curve; the LDI example ignores convexity, recapitalisation and the term structure of repo; the xVA example is a one-factor normal-rate approximation with a proxy spread, a flat 10% cost of capital on full standardised capital and no netting set, hedge relief, DVA, wrong-way risk or bid-offer. The KVA figures in particular are upper-end: desks allocate capital cost at rates and on bases that vary widely, and the empirical anchor (8–10bp non-CCP premium in USD swaps, 2014–16) sits at the low end of the collateralised range. Use the table for signs and orders of magnitude and for the comparative statics across collateral regimes, not as a price.

Where the figures are mine rather than measured. The daily yields, ranges and record moves in Part 4 are computed from the Bank's published curve spreadsheets; they match the Bank's own characterisations (29bp prior record, 140bp four-day move, ">270bp" from 1 August) but the intraday ~5.1% print widely reported for 27–28 September 2022 has no end-of-day counterpart and was not found in a primary source. The "£65bn" programme is thirteen auctions at £5bn, not a Bank figure for a commitment. The 1.4x leverage cap in Part 3 is my arithmetic from the 350bp buffer and a 20-year duration.

Where the evidence is thin, and which way it leans. No PRA aggregate £ figure for the MA benefit exists after year-end 2021 (the c.£80bn and "40% of own funds" figures are 2020–22); the "~£70bn" figure sometimes quoted could not be verified. No primary source quantifies UK insurers' cross-currency swap books or non-sterling asset share, LPI liability share, the split of LDI notional between repo, swaps and TRS, a UK 30-year asset-swap series, repo funding costs for LDI funds, longevity-swap volumes for 2021–23 (other than the Hymans series used), or the Bermuda share of funded-re cessions. CNRF pricing and haircuts are deliberately unspecified by the Bank until activation. The bulk-annuity series mixes consultants (Hymans for 2009–24) and disagrees at the margin (LCP 2019 £43.8bn vs Hymans £43.6bn; WTW 2024 £52bn vs Hymans £47.8bn; 2025 counts 354–374 depending on tranche aggregation). Where a document was read only through a law-firm or consultant summary the register says so. Web-search budgets were exhausted in three of the five research passes; the GAPS sections record what was still open.

Corrections made during the verification pass. (1) Evidence file E states that the pension-fund CVA capital exemption was "retained" in PS17/23; the PRA's near-final policy statement says the opposite — "removed the existing temporary CVA exemption for transactions with pension funds, but introduced a new risk weight that is lower than Basel 3.1 standards" — and file D's account is the one used here. (2) File D's KVA arithmetic applied an obsolete 2.33 multiplier and divided an annual capital cost by a one-off PV01; the xVA table has been recomputed as the present value of the capital cost over the run-off of capital, which raises the collateralised KVA (7–13bp rather than

~3bp) and the uncollateralised range. (3) The Bank's April 2026 news release on CP8/26 rendered "1 October 2026" in one fetch; the CP page and two law-firm summaries confirm the rules apply from 1 July 2027 with a 30 September 2026 grandfathering line, which is what the note uses. (4) TPR's "£1.5trn to £0.7trn" is LDI notional, not assets; the Bank's "over £1 trillion invested" is assets — the note keeps the distinction. (5) Twelve primary documents behind the executive summary were re-fetched on 10 September 2026 and every figure matched: the Purple Book 2025 release, CP8/26, the PRA's 2022 MA/FS paper, LIST 2025, the SI 2025/670 memorandum, the Bank's gilt-repo discussion paper, the DMO remit revision, the Truran and Woods speeches, TPR's LDI market oversight, and the Pension Schemes Act (one summarised fetch of the Parliament page returned "8 May 2026" for Royal Assent; the stages page and legislation.gov.uk both give 29 April 2026, which is used). The FSR December 2022 section page carrying the £70bn / £14bn / £23bn / 29bp figures is blocked to automated fetching; those figures are corroborated by the IMF's 2023 Selected Issues Paper ("roughly £70 billion", "£37 billion in gilts", "£19.3 billion") and by the Cunliffe letters.

What this iteration does not do. It does not build a deal register (there is no ISIN-keyed public record of bulk annuities), does not model an insurer balance sheet, does not price LPI or longevity, and takes the consultants' volume series on trust. Open threads worth pulling next: a UK asset-swap and gilt-swap-spread series (Bloomberg/Refinitiv); insurers' derivative notionals from SFCR QRTs; the CP8/26 policy statement when it appears; LIST 2028 scope in Q4 2026; the Bank's early-2027 repo proposals; and the first surplus-release regulations.

> Derived from public sources — see method. Estimates, not official publications. Not investment advice. · bzhmacro.com

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Source registers

Every citation tag in the note resolves to one of the entries below. Each register is the SOURCE REGISTER section of the corresponding evidence file in `02_research/`, which also carries the numbers table, verbatim quotes and GAPS for that topic.

Register A — Market structure and products (74 sources · 02_research/A_market_structure.md)

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