

Market Price Monitor

Local Equity Markets

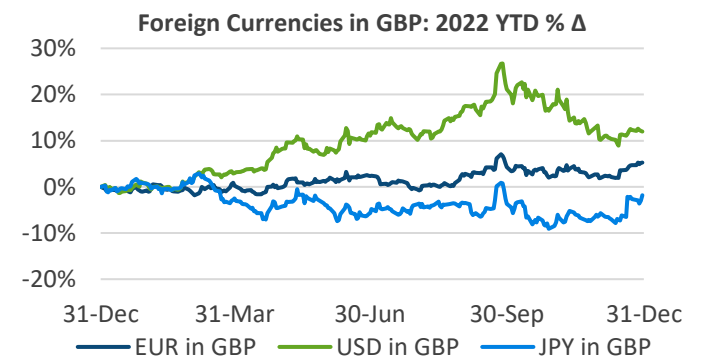
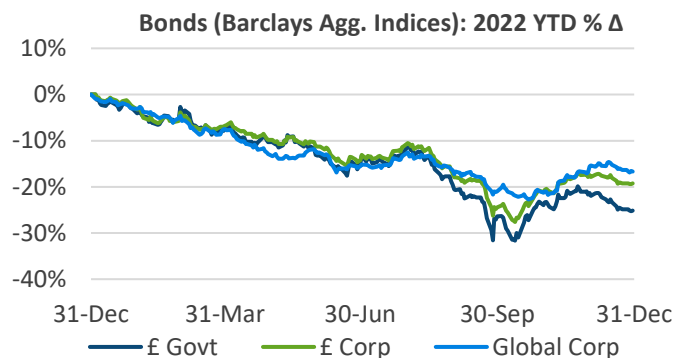
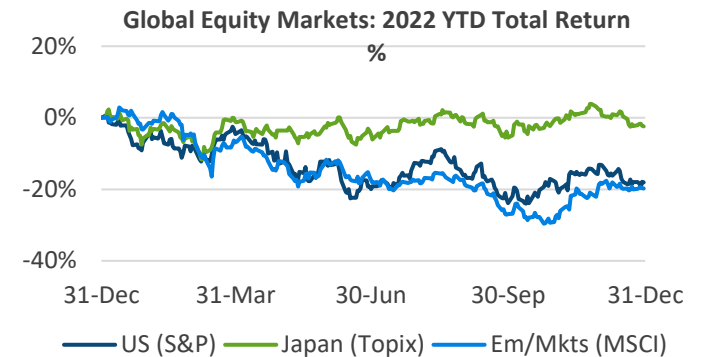
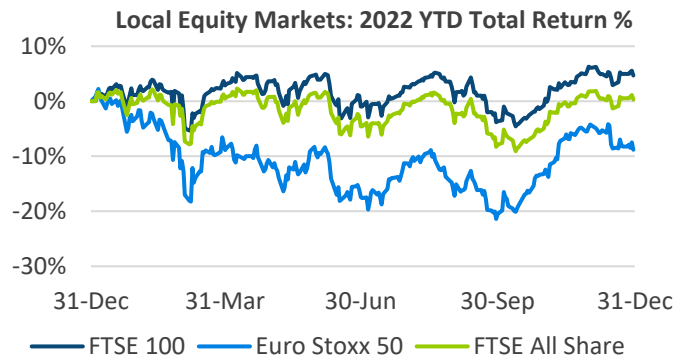
- Equity markets had a negative performance in December, as the Fed and the ECB both reiterated their commitment to battle inflation, and signalled that markets should expect higher rates for longer than they were pricing in.
- The Euro Stoxx 50 fell by 4.3%, bringing its year-to-date losses to 8.8%.
- The FTSE 100 ended the month down 1.5%, returning 4.7% year-to-date.

Global Equity Markets

- The S&P 500 ended the month down 5.8%, and the Japanese Topix lost 4.6%.
- The MSCI Emerging Markets index fell 1.4%.

Bond/FX Markets

- The British government bond index ended the month 4.4% lower, having lost 25.1% year-to-date.
- The British corporate bond index was down 1.7%, while its global counterpart was relatively unchanged in December.
- The British Pound had a mixed performance in December, gaining 1.2% against the US Dollar. Meanwhile weakening against the Japanese Yen and the Euro by 4.9% and 2.5%, respectively.



	FTSE 100	FTSE All Share	Euro Stoxx 50	US (S&P)	Japan (Topix)	Em/Mkts (MSCI)	£ Govt	£ Corp	Global Corp	EUR in GBP	USD in GBP	JPY in GBP
1 Month	-1.5%	-1.4%	-4.3%	-5.8%	-4.6%	-1.4%	-4.4%	-1.7%	0.2%	2.5%	-1.2%	4.9%
3 Month	8.7%	8.9%	14.6%	7.6%	3.3%	9.8%	1.7%	6.9%	5.4%	0.9%	-7.6%	1.9%
1 Year	4.7%	0.3%	-8.8%	-18.1%	-2.5%	-19.7%	-25.1%	-19.3%	-16.7%	5.2%	12.0%	-1.8%
YTD	4.7%	0.3%	-8.8%	-18.1%	-2.5%	-19.7%	-25.1%	-19.3%	-16.7%	5.2%	12.0%	-1.8%

Milliman Financial Risk Management

London Market Monitor – 30 December 2022

Data sources: Bloomberg; Barclays; EIOPA; PRA; Oxford-Man Institute; ONS; Milliman FRM

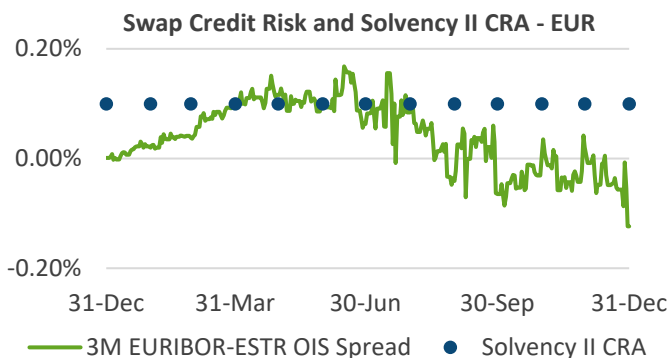
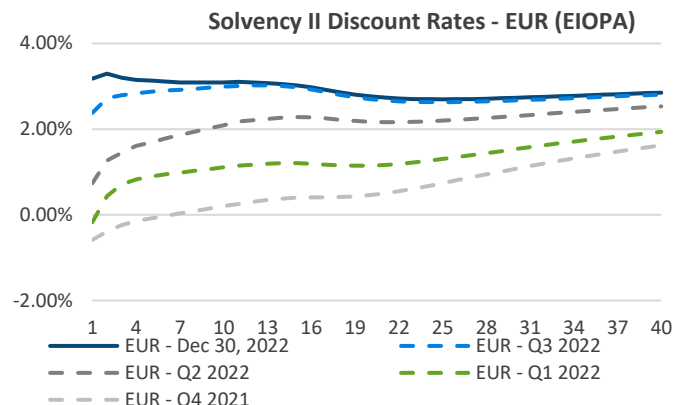
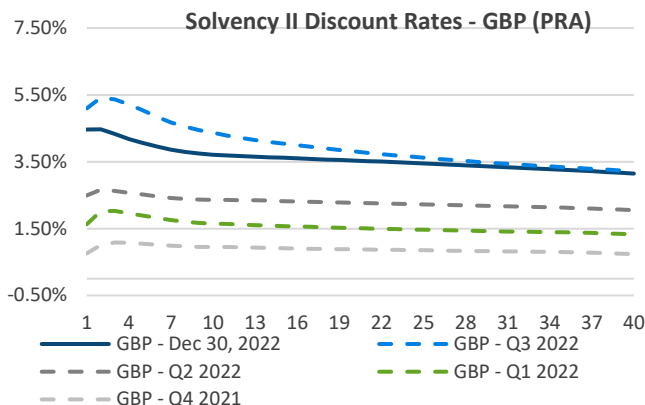
Solvency II Monitor - Rates

Risk Free Rates

- Both GBP and EUR risk-free rates increased at all terms in December.
- The increases were more pronounced at the medium to longer terms in the GBP risk-free curve.
- The 20-year and 30-year GBP risk-free rates rose by 47 and 49 basis points, respectively.
- The EUR 5 and 10-year risk-free rates increased by 58 and 59 basis points, respectively.

Credit Risk Adjustment

- The EUR CRA was unchanged and remains floored at 10 basis points.



	Change in GBP Discount (bps)				
	1Y	Y5	Y10	Y20	Y30
Since Q3 2022	-63	-98	-65	-27	-11
Since Q2 2022	197	154	135	126	118
Since Q1 2022	283	217	206	202	193
Since Q4 2021	370	301	276	266	253

	Change in EUR Discount and CRA (bps)					
	1Y	Y5	Y10	Y20	Y30	CRA
Since Q3 2022	80	26	10	7	6	0
Since Q2 2022	244	144	100	60	42	0
Since Q1 2022	335	224	198	162	120	0
Since Q4 2021	376	322	289	231	166	0

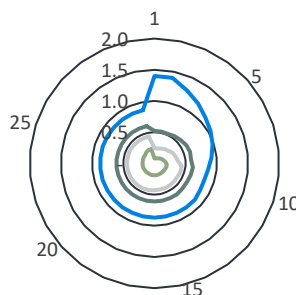
Solvency II Monitor - Spreads

Fundamental Spreads

- There were no material changes since the last report.

Fundamental Spreads %

GBP - Financial

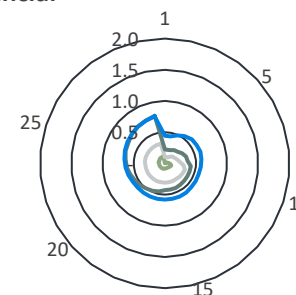


— AAA — AA — A — BBB

GBP Financial Fundamental Spread %					
	1Y	Y5	Y10	Y20	Y30
AAA	0.08	0.12	0.20	0.19	0.23
AA	0.24	0.30	0.44	0.44	0.44
A	0.52	0.56	0.61	0.61	0.61
BBB	1.40	1.10	0.84	0.87	0.87

GBP Financial 'Before Floor' %					
	1Y	Y5	Y10	Y20	Y30
AAA	0.00	0.04	0.08	0.16	0.23
AA	0.04	0.07	0.11	0.19	0.27
A	0.06	0.12	0.20	0.32	0.44
BBB	0.16	0.25	0.34	0.49	0.59

GBP - Non-Financial



— AAA — AA — A — BBB

GBP Non-Financial Fundamental Spread %					
	1Y	Y5	Y10	Y20	Y30
AAA	0.00	0.01	0.11	0.09	0.12
AA	0.10	0.16	0.34	0.31	0.32
A	0.22	0.28	0.42	0.53	0.78
BBB	0.44	0.58	0.57	0.58	0.77

GBP Non-Financial 'Before Floor' %					
	1Y	Y5	Y10	Y20	Y30
AAA	0.00	0.01	0.04	0.07	0.12
AA	0.00	0.04	0.09	0.18	0.26
A	0.04	0.15	0.28	0.53	0.78
BBB	0.11	0.23	0.36	0.57	0.77

The **Solvency II risk-free discount rates** are based on applying the Smith-Wilson Extrapolation to LIBOR swap rates sourced from Refinitiv and applying the Credit Risk Adjustment as defined in the Technical Specs. The data is provided by EIOPA for EUR, and by PRA for GBP, as of 31/12/22.

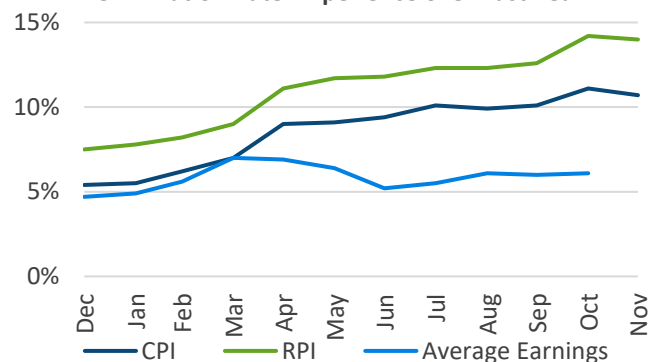
The **Credit Risk Adjustment** is a component of the risk-free discount curve defined by EIOPA. It is calculated from actual experience in the 'LIBOR-OIS' spread (3 months for EUR), and is bounded between 0.10 and 0.35. We show actual LIBOR-OIS spread levels and the defined CRA, for EUR.

EIOPA fundamental spreads show the credit spread corresponding to the risk of default or downgrading of an asset. This is shown here across financial and non-financial assets, credit quality steps 0-3 and durations of 1-30 years. The data is provided by EIOPA and as of 31/12/22. **Fundamental spread** = maximum (probability of default + cost of downgrade; 35% of long-term average spread). In the tables we show the **'before floor'** measure = probability of default + cost of downgrade.

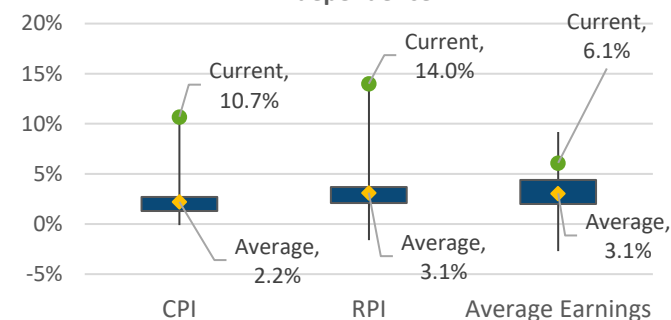
UK Inflation Monitor

- UK's CPI fell by 40 basis points in November to 10.7%.
- The RPI measure declined by 20 basis points to 14.0% in November.
- According to the ONS: "The largest downward contribution to the change came from transport, particularly motor fuels, with rising prices in restaurants, cafes and pubs making the largest, partially offsetting, upward contribution."
- Average earnings rose by 10 basis points to 6.1% in October.
- UK's Q3 2022 GDP growth figure was revised lower by 50 basis points to 1.9%.
- The projected RPI curve declined further at the 1-year tenor whilst the rest of the curve remained relatively unchanged.

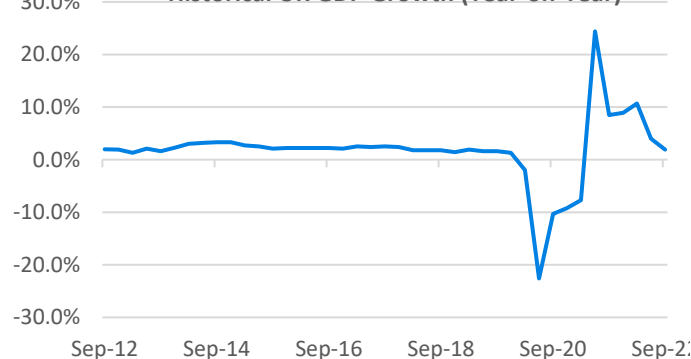
UK Inflation Rate: Experience over Past Year



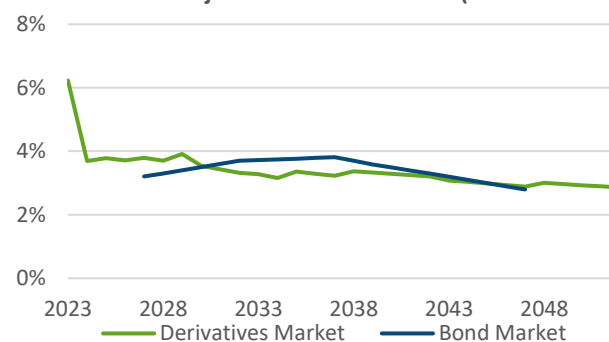
Max, Min and 50% Range: Since BoE Independence



Historical UK GDP Growth (Year-on-Year)



Projected UK RPI Inflation (Year-on-Year)



Historical year-on-year inflation rate is assessed by the % change on:

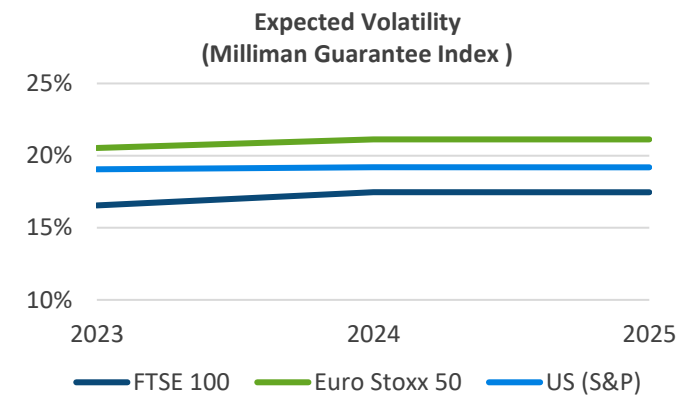
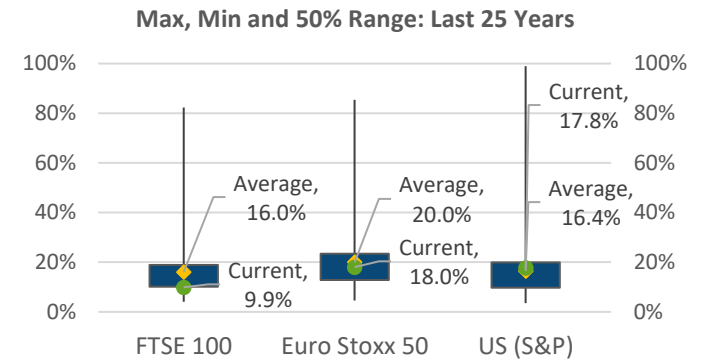
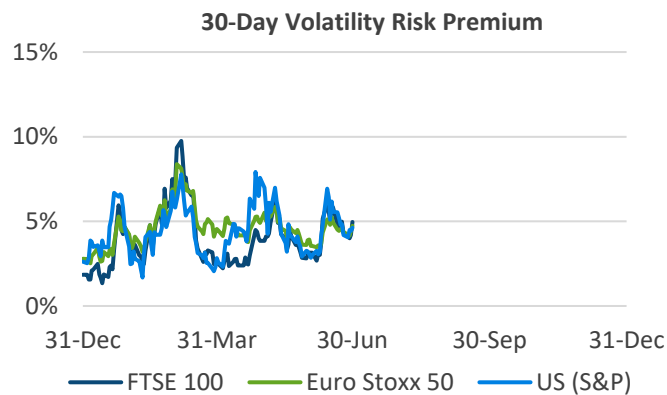
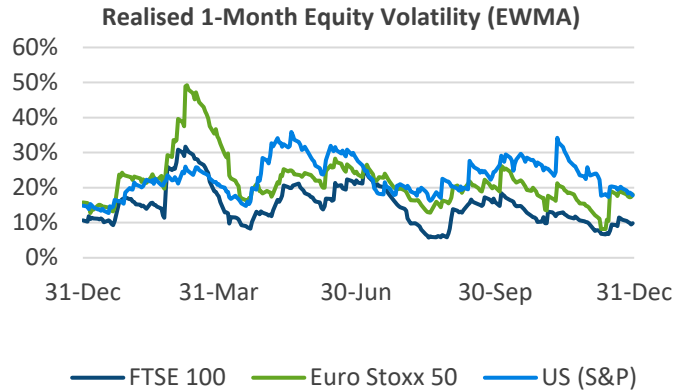
- **Consumer Price Index (CPI)** – measuring the monthly price of a basket of consumer goods and services
- **Retail Price Index (RPI)** – similar to CPI, but the main difference due the addition of mortgage payments, council tax and other housing costs
- **Average Earnings** – measuring the average total weekly employee remuneration over the previous 3 months.

Projection year-on-year inflation rate is the forward rate calculated from market data:

- **Derivatives Market View** – constructed from zero coupon inflation par swap rates against the RPI index at various tenors
- **Bond Market View** – constructed from the difference between the nominal rates implied by the conventional gilts and the real rates implied by the index-linked (RPI) gilts.

Volatility and Hedging Cost Monitor

- Realised volatilities on major indices fell at the start of the month, before ticking higher into month-end for the Euro Stoxx 50, whilst the S&P 500 and the FTSE 100 saw their realised volatilities decline towards the end of the month following an increase mid-month.
- The FTSE 100 ended the month with a realised volatility of 9.9%. The same measure stood at 18.0% and 17.8% on the Euro Stoxx 50 and the S&P 500.
- ** Please note that due to some missing data the volatility risk premiums have only been updated to the 28th of June. **



Actual realised equity volatility is measured by the weighted standard deviation of 1 month daily index change. The Exponentially Weighted Moving Average (EWMA) methodology places more importance to the recent returns in the calculation of the volatility.

Volatility Risk Premium is estimated as the difference between 30-day implied volatility and projected realised volatility (on data from the Oxford-Man Institute). This reflects the additional cost of hedging from purchasing a basket of options, in comparison to managing a dynamic delta hedge with futures (ignoring rolling transaction costs).

Expected realised volatility is an intermediate result from the [Milliman Guarantee Index™ \(MGI\)](#), which provides volatility parameters for variable annuity guarantee (VA) valuation and risk management. The levels shown are on an expected basis, and do not reflect any risk adjustment.

Chicago

71 South Wacker Drive
Chicago, IL 60606
+1 855 645 5462

London

11 Old Jewry
London
EC2R 8DU
UK
+44 0 20 7847 1557

Sydney

32 Walker Street
North Sydney, NSW 2060
Australia
+610 2 8090 9100

Amsterdam

Haaksbergweg 75
Amsterdam, 1101 BR
Netherlands
+31 6 211 70 583

Creating transformational improvement in the retirement savings industry.

Milliman Financial Risk Management LLC / Milliman Financial Strategies Ltd. is a global leader in financial risk management to the retirement savings industry. Milliman FRM provides investment advisory, hedging, and consulting services on approximately \$176.1 billion USD in global assets (31 December 2021).

Established in 1998, the practice includes professionals operating from four trading platforms around the world (Chicago, London, Amsterdam and Sydney).

[MILLIMAN.COM/FRM](https://www.milliman.com/frm)

Milliman is among the world's largest providers of actuarial and related products and services. The firm has consulting practices in healthcare, property & casualty insurance, life insurance and financial services, and employee benefits. Founded in 1947, Milliman is an independent firm with offices in major cities around the globe.

Recipients must make their own independent decisions regarding any strategies or securities or financial instruments mentioned herein.

The products or services described or referenced herein may not be suitable or appropriate for the recipient. Many of the products and services described or referenced herein involve significant risks, and the recipient should not make any decision or enter into any transaction unless the recipient has fully understood all such risks and has independently determined that such decisions or transactions are appropriate for the recipient.

Past performance is not indicative of future results. Index performance information is for illustrative purpose only, does not represent the performance of any actual investment or portfolio, and should not be viewed as a recommendation to buy/sell. It is not possible to invest directly in an index. Any hypothetical, backtested data illustrated herein is for illustrative purposes only, and is not representative of any investment or product.

Any discussion of risks contained herein with respect to any product or service should not be considered to be a disclosure of all risks or a complete discussion of the risks involved.

The recipient should not construe any of the material contained herein as investment, hedging, trading, legal, regulatory, tax, accounting or other advice. The recipient should not act on any information in this document without consulting its investment, hedging, trading, legal, regulatory, tax, accounting and other advisors.

The materials in this document represent the opinion of the authors and are not representative of the views of Milliman, Inc. Milliman does not certify the information, nor does it guarantee the accuracy and completeness of such information. Use of such information is voluntary and should not be relied upon unless an independent review of its accuracy and completeness has been performed. Materials may not be reproduced without the express consent of Milliman.

Milliman Financial Strategies Ltd. is authorised and regulated by the Financial Conduct Authority. Firm Registration Number 539399