

Market Price Monitor

Local Equity Markets

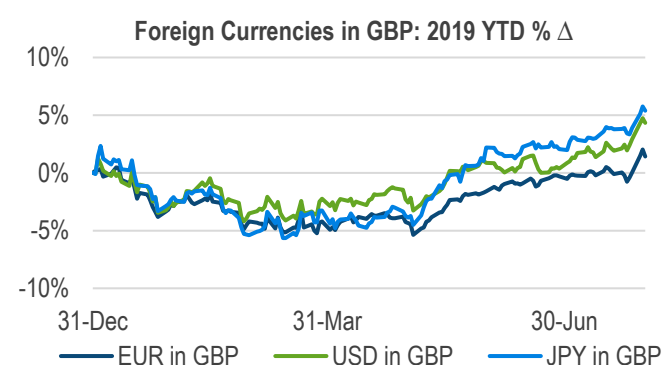
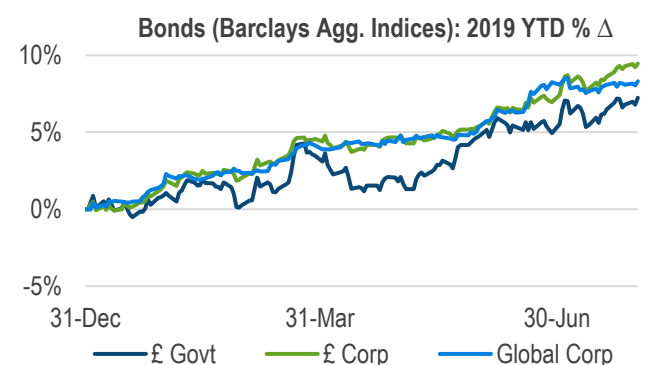
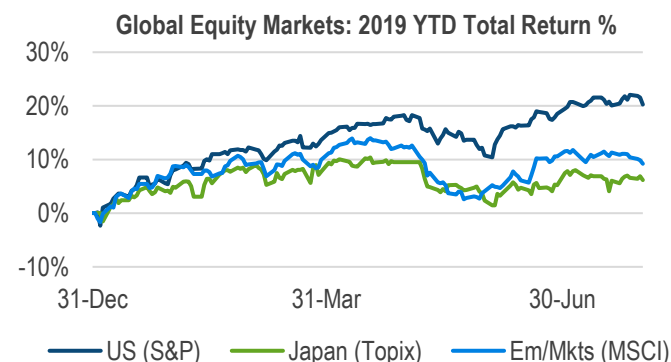
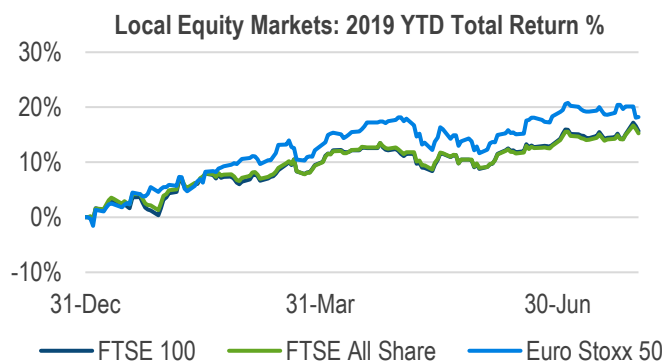
- Equity markets had a modest performance in July, as the US Federal Reserve lowered interest rates by 25 basis points for the first time in 11 years.
- The FTSE 100 was one of the best performers of the month, gaining 2.2% on the back of a weaker British Pound.
- The Euro Stoxx 50 ended the month flat, down by 0.2%.

Global Equity Markets

- Global equity markets had a mixed performance in July, with the biggest loser being the Emerging Market index, down by 1.2%.
- The S&P 500 was up 1.4% at month-end, while the Japanese equity markets had a small gain of 0.9%.

Bond/FX Markets

- UK government bonds gained 2.2% as the global central banks set the tone for further monetary easing in the near future.
- UK corporate bonds performed better than their global counterparts as they returned 2.3%, compared to the 0.1% of the latter.
- The Pound lost 4% and 3.3% against the US Dollar and the Japanese Yen, while losing 1.7% against the Euro as the British currency weakened during the period of Brexit uncertainty.



Total Returns as of July 31, 2019

	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	2.2%	2.0%	-0.1%	1.4%	0.9%	-1.2%	2.2%	2.3%	0.1%	1.7%	4.0%	3.3%
3 Month	3.2%	2.6%	0.1%	1.7%	-3.1%	-2.7%	5.3%	4.7%	3.5%	5.9%	6.8%	9.5%
1 Year	2.3%	1.3%	1.1%	8.0%	-8.6%	-2.2%	7.9%	8.8%	7.2%	2.2%	7.5%	10.7%
YTD	15.7%	15.2%	18.2%	20.2%	6.2%	9.2%	7.2%	9.5%	8.3%	1.4%	4.3%	5.4%

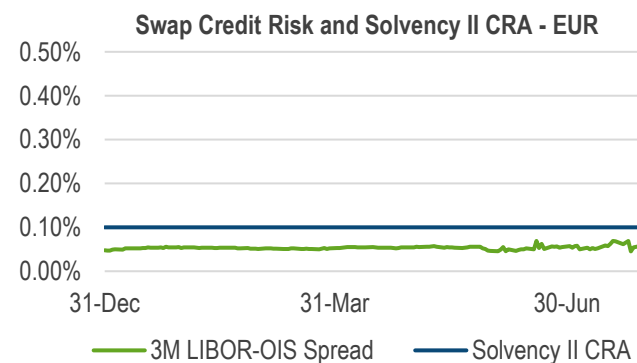
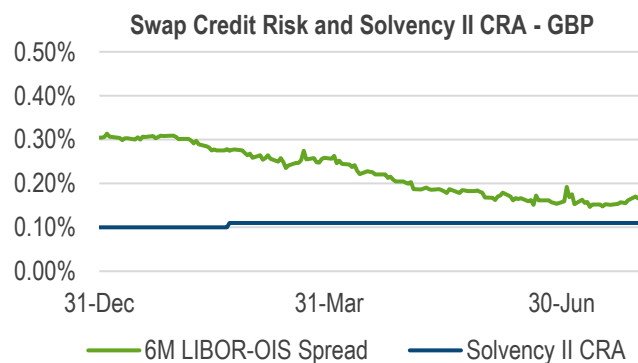
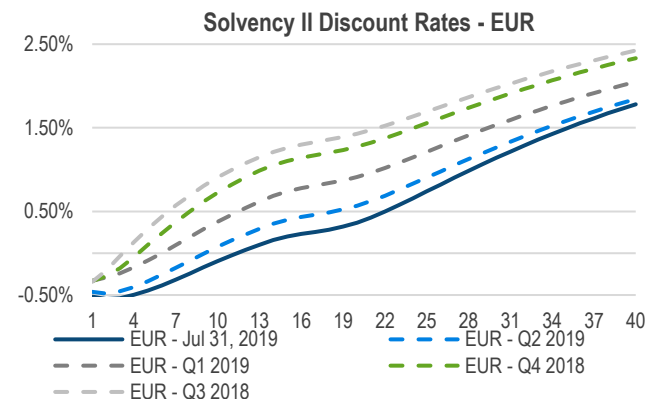
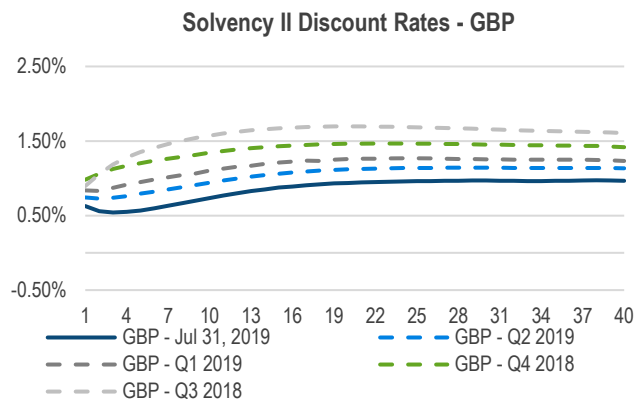
Solvency II Monitor - Rates

Risk Free Rates

- As bond prices continued their rise, risk free rates decreased at all terms yet again.
- The 5-year GBP Solvency II risk-free rates declined by 23 basis while the 10 and 20-year decreased by 21 and 18 basis points respectively.
- European swap rates made historical record lows in July as short to medium-term rates moved more into negative territory.
- European 20-year rates had a 20 basis point decrease while the 10 and 30-year terms saw a decrease of 17 and 13 basis points, respectively.

Credit Risk Adjustment

- GBP and EUR CRAs remained unchanged at 11 and 10 basis points respectively.



Change in GBP Discount and CRA (bps)						
	1Y	Y5	Y10	Y20	Y30	CRA
Since Q2 2019	-12	-23	-21	-18	-17	0
Since Q1 2019	-21	-38	-37	-32	-29	0
Since Q4 2018	-35	-64	-61	-53	-48	1
Since Q3 2018	-27	-79	-84	-76	-69	1

Change in EUR Discount and CRA (bps)						
	1Y	Y5	Y10	Y20	Y30	CRA
Since Q2 2019	-6	-11	-17	-20	-13	0
Since Q1 2019	-19	-36	-47	-55	-39	0
Since Q4 2018	-19	-54	-82	-91	-71	0
Since Q3 2018	-18	-74	-100	-106	-83	0

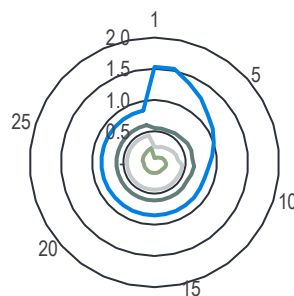
Solvency II Monitor - Spreads

Fundamental Spreads

- The fundamental spread data shown is for the end of June.
- There were no material changes since the last report.

Fundamental Spreads %

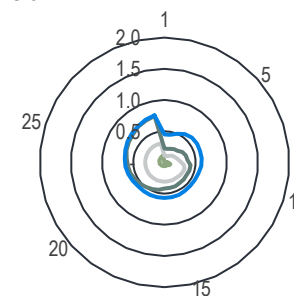
GBP - Financial



— AAA — AA — A — BBB

GBP Financial Fundamental Spread %					
	1Y	Y5	Y10	Y20	Y30
AAA	0.07	0.11	0.19	0.17	0.23
AA	0.25	0.31	0.45	0.44	0.44
A	0.55	0.58	0.62	0.61	0.61
BBB	1.53	1.15	0.84	0.85	0.85
GBP Financial 'Before Floor' %					
	1Y	Y5	Y10	Y20	Y30
AAA	0.00	0.04	0.08	0.16	0.23
AA	0.04	0.06	0.11	0.19	0.27
A	0.06	0.13	0.21	0.34	0.47
BBB	0.16	0.27	0.37	0.53	0.65

GBP - Non-Financial



— AAA — AA — A — BBB

GBP Non-Financial Fundamental Spread %					
	1Y	Y5	Y10	Y20	Y30
AAA	0.00	0.01	0.10	0.07	0.11
AA	0.11	0.16	0.34	0.31	0.31
A	0.22	0.28	0.42	0.52	0.76
BBB	0.45	0.59	0.57	0.57	0.77
GBP Non-Financial 'Before Floor' %					
	1Y	Y5	Y10	Y20	Y30
AAA	0.00	0.01	0.04	0.07	0.11
AA	0.00	0.04	0.08	0.17	0.25
A	0.04	0.15	0.27	0.52	0.76
BBB	0.11	0.22	0.35	0.56	0.77

The **Solvency II risk-free discount rates** are based on applying the Smith-Wilson Extrapolation to LIBOR swap rates sourced from Bloomberg (current curve is for 31/07/19) and applying the Credit Risk Adjustment as defined in the Technical Specs.

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, 6 months for GBP), and is bounded between 0.10 and 0.35. We show actual LIBOR-OIS spread levels and the defined CRA, for both GBP and EUR.

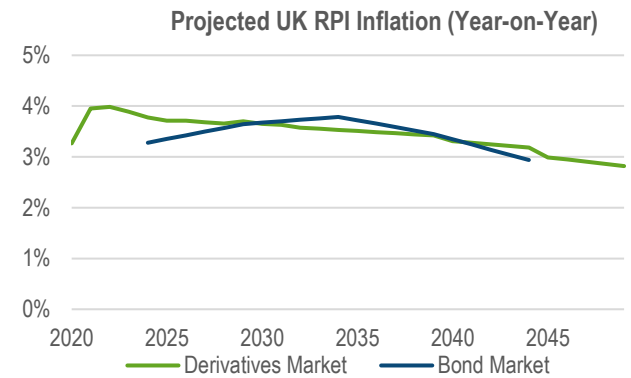
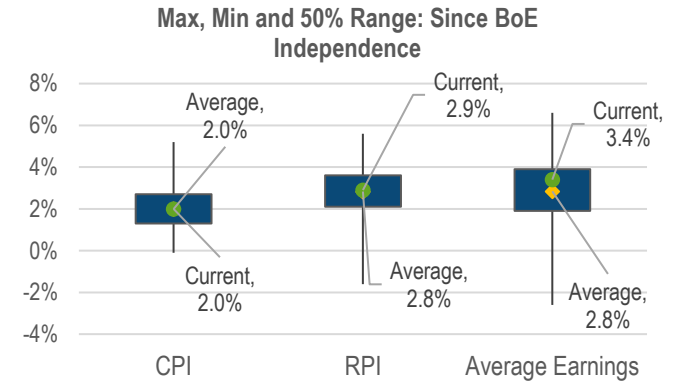
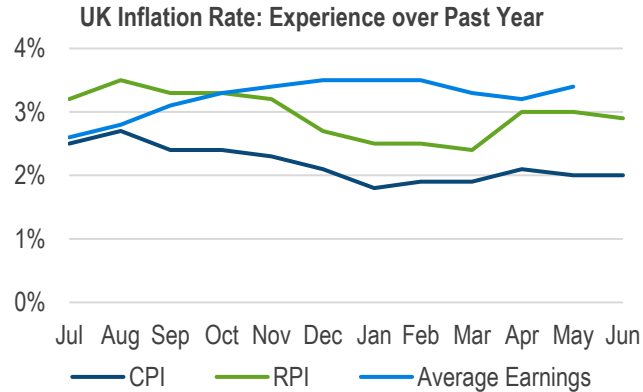
EIOPA fundamental spreads show the credit spread corresponding to the risk of default or downgrading of an asset. This is shown here across financial and non-financial assets, credit quality steps 0-3 and durations of 1-30 years. The data is provided by EIOPA and as of 30/06/19. **Fundamental spread** = 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

- The UK CPI inflation remained unchanged at 2% in June, while the RPI saw a 10 basis point decrease to 2.9%.
- According to the ONS: "The largest downward contributions came from motor fuels, accommodation services and electricity, gas and other fuels. The largest offsetting upward contributions came from clothing and food"
- Average earnings increased by 30 basis points in May, with the headline figure now at 3.4%.
- Short-term projected RPI increased in the derivatives market, while there were no real material changes to the rest of the curve.
- There were no updates to the GDP figure this month.

House of Lords' Report

- There are no updates since the last report.



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

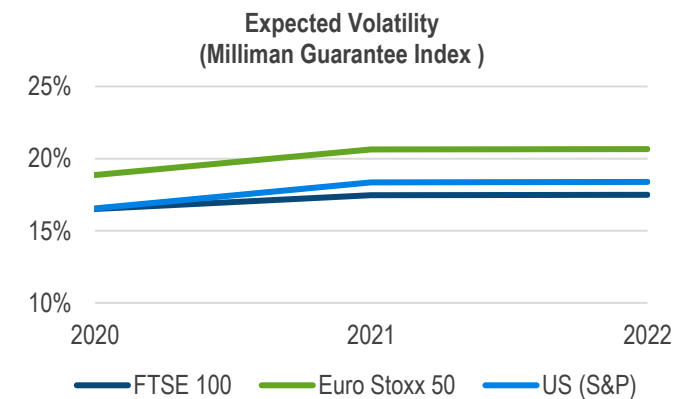
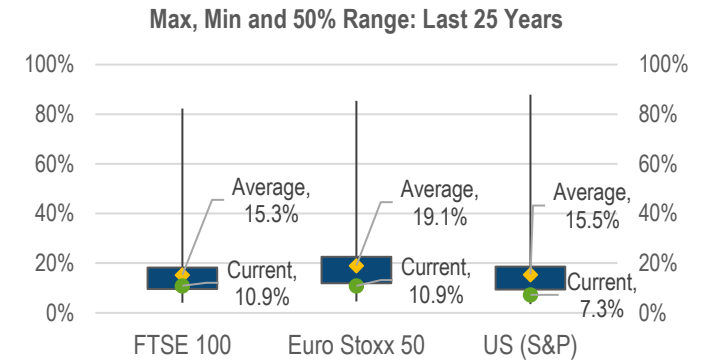
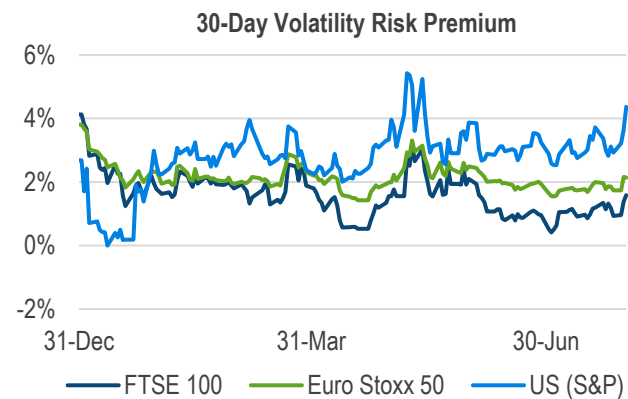
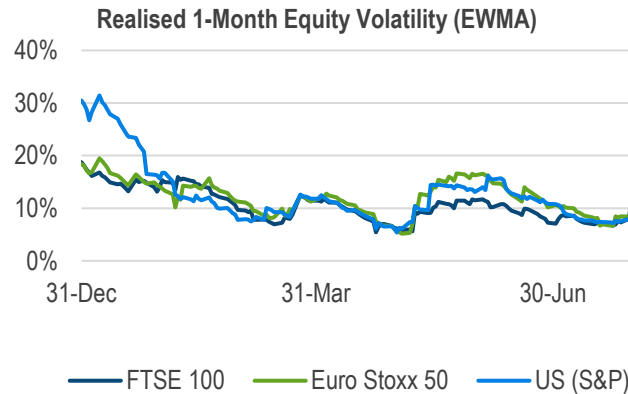
- **Consumer Price Index (CPI)** – measuring the monthly price of a basket of consumer goods and services
- **Retail Price Index (RPI)** – similar to CPI, but the main difference due the addition of mortgage payments, council tax and other housing costs
- **Average Earnings** – measuring the average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

- Volatility remained under 10% amongst the developed economies for most of July.
- The FTSE 100 and The Euro Stoxx 50 realised volatilities spiked above 10% on the last day of month, while the S&P 500s realised volatility stood at 7.3% at month-end.
- Volatility risk premiums for UK, EU and US equities also spiked on the last day of the month as they stood at 1.6%, 2.1% and 4.4% respectively, on the back of increasing trade tensions and the US Federal Reserve signalling that further monetary easing may not be required as some investors may have speculated.



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.

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 over \$150 billion in global assets (as of June 30, 2019).

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.

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

MILLIMAN.COM/FRM

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

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