

### Market Price Monitor

#### Local Equity Markets

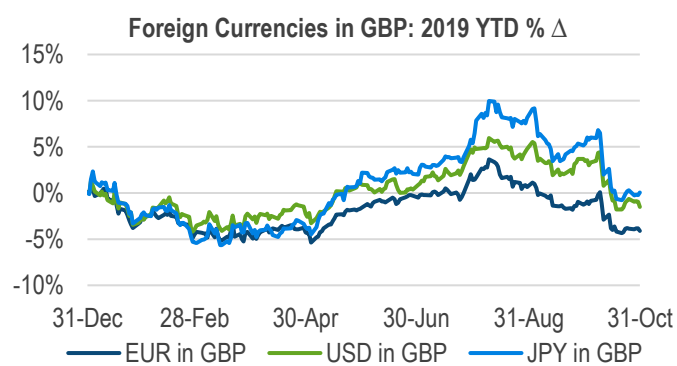
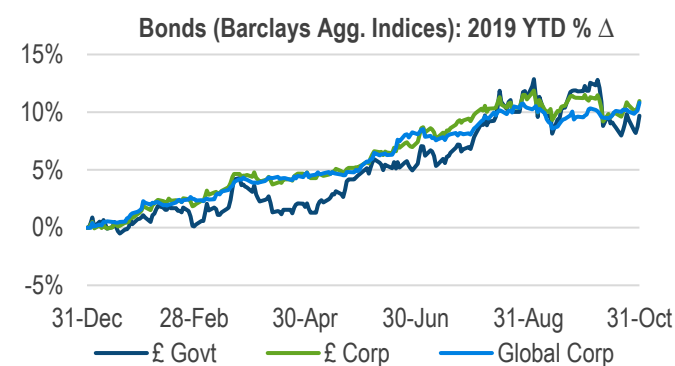
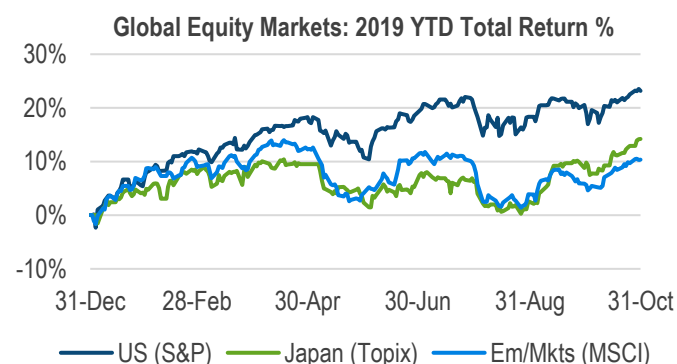
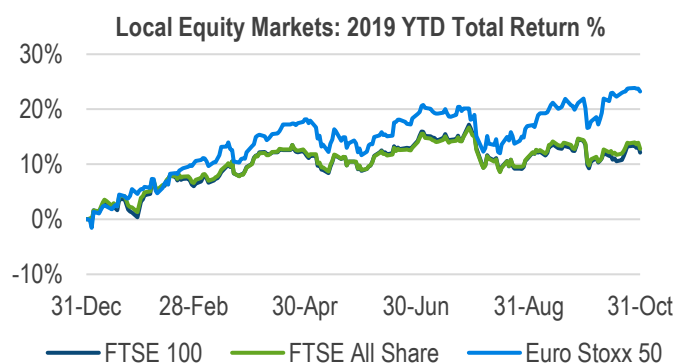
- European equity markets had a mixed performance in October.
- The FTSE 100 was the underperformer in October. It lost 1.9% during the month as the British Pound strengthened, while the risk of a no-deal Brexit narrowed and another Brexit extension was granted.
- The Euro Stoxx 50 gained 1.1%, up 23.2% for the year-to-date.

#### Global Equity Markets

- Global equity markets continued their strong performance from September, as the Federal Reserve cut rates by another 25 basis points (the third cut this year) and the US-China trade talks took a more constructive outlook.
- The S&P 500 was up by 2.2% at month end, while Japanese and emerging markets equities returned 5% and 4.2% respectively.

#### Bond/FX Markets

- UK government bonds had a disappointing month, losing 1.9%.
- British corporate bonds, ended the month almost flat returning -0.2%. In contrast global corporate bonds were up 1.2%.
- The British Pound had a very strong performance in October, up 5% against the US Dollar. While gaining 4.9% and 2.9% against the Japanese Yen and the Euro.



Total Returns as of October 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	-1.9%	-1.4%	1.1%	2.2%	5.0%	4.2%	-1.9%	-0.2%	1.2%	-2.9%	-5.0%	-4.9%
3 Month	-3.1%	-2.1%	4.2%	2.4%	7.6%	1.0%	2.3%	1.4%	2.3%	-5.4%	-5.6%	-5.1%
1 Year	6.5%	6.8%	15.9%	14.3%	3.9%	11.9%	10.9%	10.4%	11.8%	-2.8%	-1.4%	3.2%
YTD	12.1%	12.8%	23.2%	23.2%	14.2%	10.4%	9.7%	11.0%	10.8%	-4.1%	-1.5%	0.1%

## Milliman Financial Risk Management

London Market Monitor – 31 October 2019

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

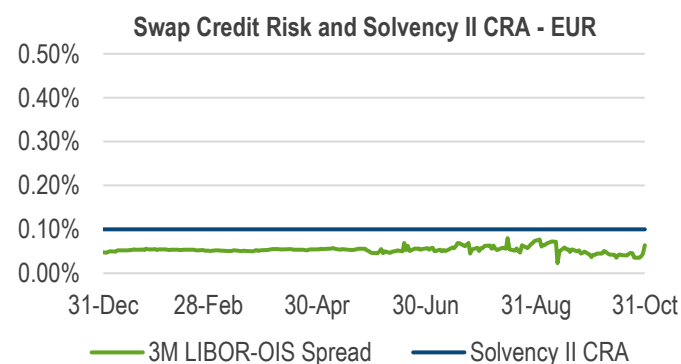
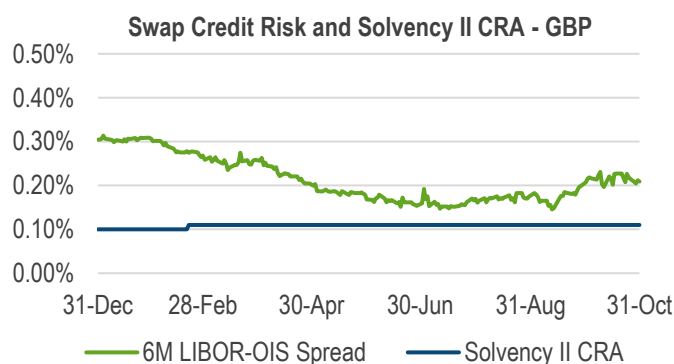
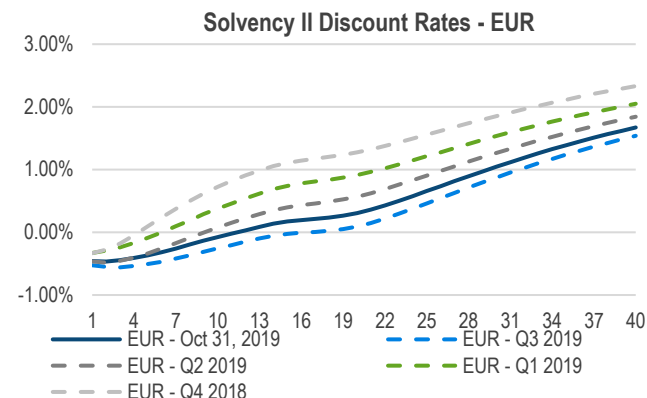
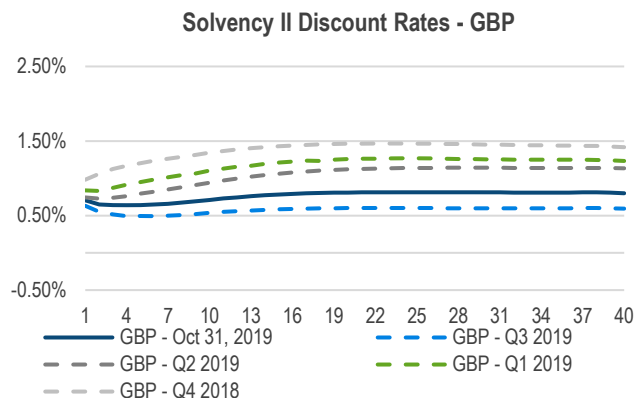
### Solvency II Monitor - Rates

#### Risk Free Rates

- GBP Solvency II risk-free rates climbed higher at all terms in October.
- The 20-year and 30-year rates both increased by 21 basis points, while the 10-year rate saw an increase of 18 basis points.
- European risk-free rates also increased at all terms, for the second consecutive month.
- The 20-year EUR rate saw the biggest increase, as they climbed 21 basis points during the month.
- The 10-year EUR risk-free rate increased by 18 basis points, while the 30-year rate increased by 17 basis points.
- Both GBP and EUR Solvency II risk-free rate levels remain materially lower than those at the start of the year, but above those at Q3 2019.

#### 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 Q3 2019	7	15	18	21	21	0
Since Q2 2019	-4	-15	-23	-31	-33	0
Since Q1 2019	-14	-31	-39	-45	-44	0
Since Q4 2018	-28	-56	-63	-66	-64	1

	Change in EUR Discount and CRA (bps)					
	1Y	Y5	Y10	Y20	Y30	CRA
Since Q3 2019	6	14	18	21	17	0
Since Q2 2019	0	-3	-15	-26	-22	0
Since Q1 2019	-13	-28	-45	-61	-49	0
Since Q4 2018	-13	-47	-80	-97	-81	0

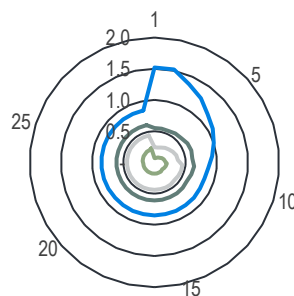
Solvency II Monitor - Spreads

Fundamental Spreads

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

Fundamental Spreads %

GBP - Financial



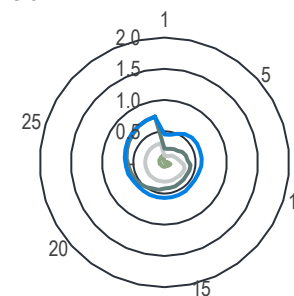
— AAA — AA — A — BBB

GBP Financial Fundamental Spread %					
	1Y	Y5	Y10	Y20	Y30
AAA	0.07	0.11	0.19	0.18	0.23
AA	0.24	0.31	0.45	0.44	0.44
A	0.55	0.58	0.62	0.61	0.61
BBB	1.52	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	0.18	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	0.75
BBB	0.45	0.59	0.57	0.57	0.75

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	0.75
BBB	0.11	0.22	0.34	0.56	0.75

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 31/10/19) 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 30/09/19. **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.

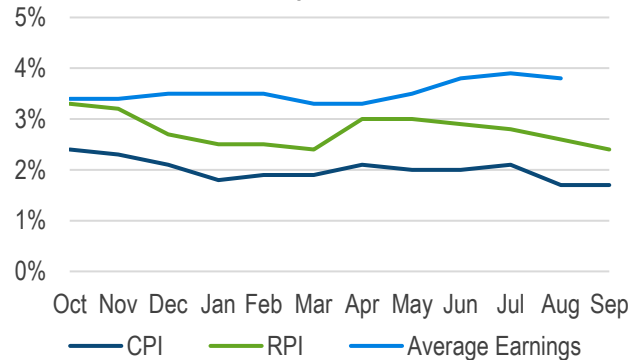
### UK Inflation Monitor

- CPI inflation remained unchanged at 1.7% in September.
- RPI inflation measure declined by 20 basis points to 2.4%.
- According to the ONS : *“The largest downward contributions, came from motor fuels, second-hand cars, and electricity, gas and other fuels. These downward movements were offset by upward movements from furniture, household appliances, hotel overnight stays, and from recreation and culture items.”*
- Average earnings in August dropped by 10 basis points to 3.8%. Despite this decline, they remain 90 basis points above their historical average.
- There were no updates to the GDP figure.

### House of Lords' Report

- On the 4<sup>th</sup> September 2019, the Chancellor of the Exchequer and the Chair of the UK Statistics Authority (UKSA) [responded](#) to the Lords' Economic Affairs Committee.
- UKSA have proposed the publication of RPI to be stopped at some point in the future. While in the interim, the shortcomings of RPI to be addressed by bringing the methods of Consumer Price Index including owner occupiers' housing costs (CPIH) into it.
- The Chancellor is unable to consent the introduction of the change UKSA have proposed to align RPI with CPIH, earlier than 2025.
- The government will consult publically in 2020, whether this change should be made earlier than 2030.
- The government has no current plans to stop issuing gilts linked to RPI.
- The Chancellor has rejected the UKSA proposal to remove the requirement on UKSA to publish RPI.

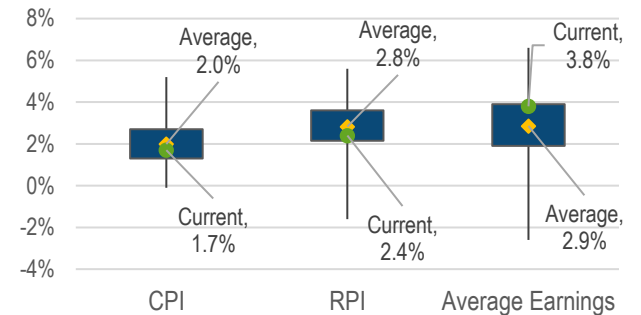
UK Inflation Rate: Experience over Past Year



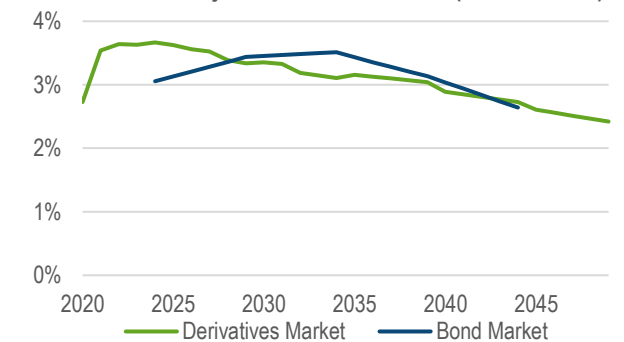
Historical UK GDP Growth (Year-on-Year)



Max, Min and 50% Range: Since BoE Independence



Projected UK RPI Inflation (Year-on-Year)



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

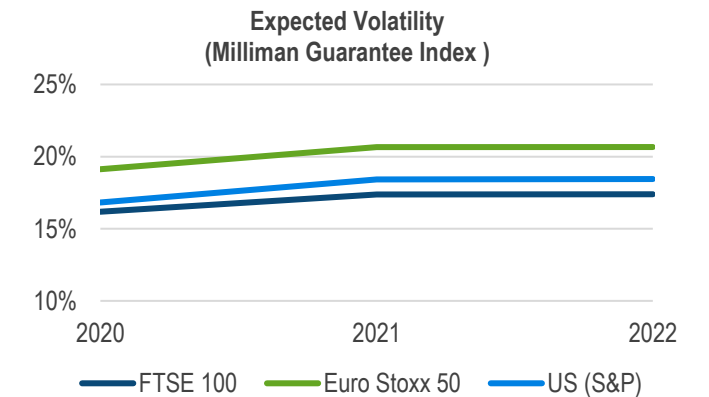
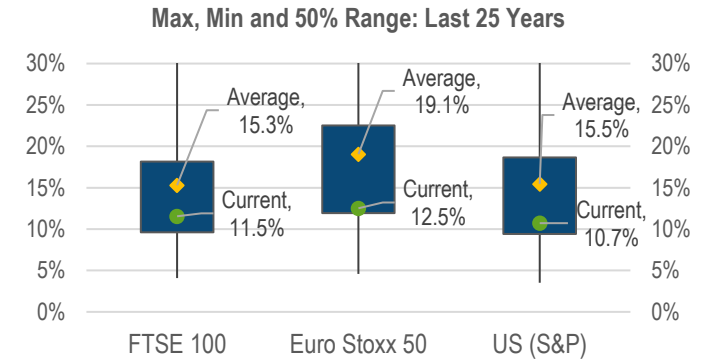
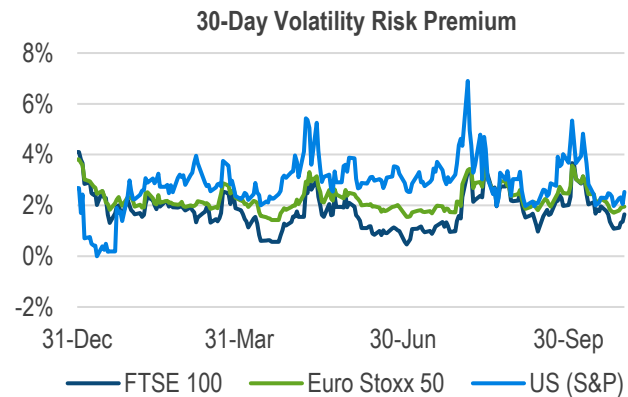
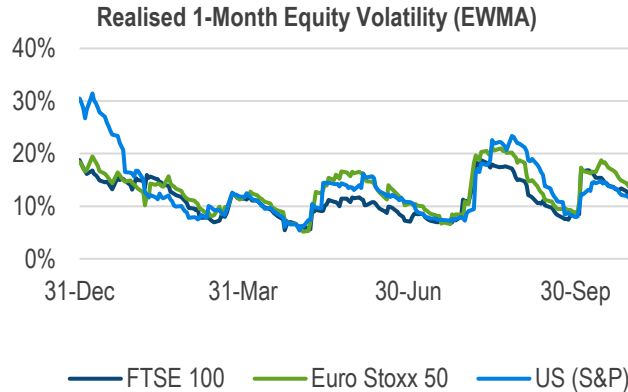
- **Consumer Price Index (CPI)** – measuring the monthly price of a basket of consumer goods and services
- **Retail Price Index (RPI)** – similar to CPI, but the main difference due the addition of mortgage payments, council tax and other housing costs
- **Average Earnings** – measuring the average 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 increased from the previous month for all major indices, as they all ended the month with a realised volatility of above 10%.
- The realised volatility of the FTSE 100 index was 11.5% at month-end, while the Euro Stoxx 50 and the S&P 500 realised volatilities stood at 12.5% and 10.7%, respectively.
- Volatility risk premiums initially spiked at the start of the month but soon declined, with the FTSE 100 volatility risk premium reaching 3.7% before ending the month at 1.7%. The volatility risk premiums for the S&P 500 and the Euro Stoxx 50 were 2.5% and 2% at month-end, respectively.



**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.

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### 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

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

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