

# QUARTERLY PERFORMANCE REVIEW

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## Bond volatility nears high end of post financial crisis range

The MOVE index – a key barometer of fixed income volatility – hit a record low of 42.53 in March but has since climbed toward the upper end of its post financial crisis range. Similarly, US Corporate Index return volatility jumped from 0.20 or lower in the previous four quarters to 0.31 in Q3 – the highest reading in 16 quarters. (p 9)

## Muni 30-year yield ratio hits highest level since 2013

With the wings of the AAA GO curve lagging the Treasury rally, the Muni 2-year yield ratio closed the quarter at its highest level since the end of 2017, and the 30-year yield ratio reached as high as 1.16 in August – its highest level since late 2013 – before closing the quarter at 1.12. (p 20)

## The bulk of Euro credit performance came from the sovereign sector

The bulk of the “credit” performance in the Euro Broad Market Index came from the sovereign sector and not corporates. With a 6.72% excess return, and a 13.3% allocation, Italy sovereigns accounted for about three-quarters of the Euro Broad Market Index 1.18% excess return in Q3. (p 25)

## BBs outperformed higher and lower rated credits

The Global High Yield Index gained less than half as much as the Global High Grade Corporate Index in Q3 (1.14% vs. 2.54%). Adjusted for duration risk, that gap narrows significantly, but high yield still had the lower excess return (0.10% vs. 0.31%). But if you break the high yield performance down by rating category you find that the BB segment actually did much better than high grade in Q3 as it scored a 0.78% excess return. (p 36)

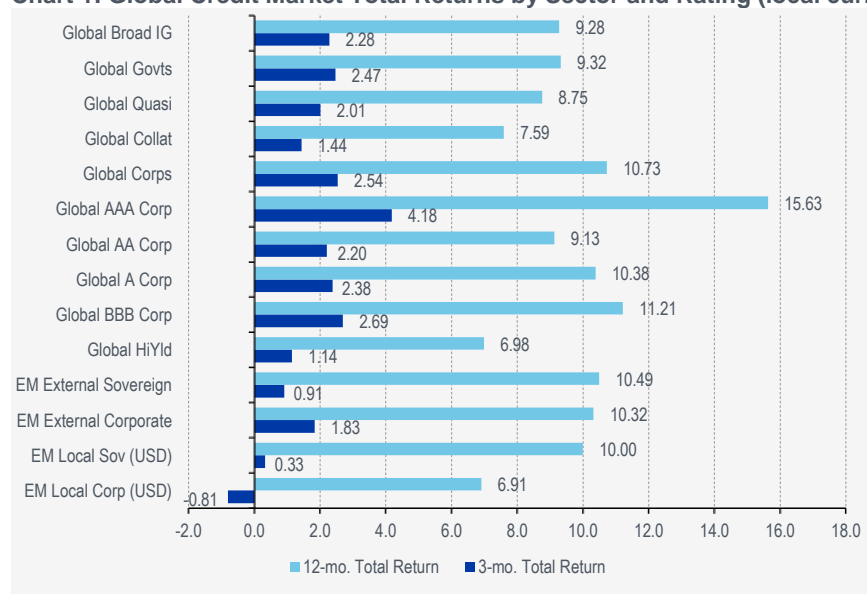
## Argentina places a big drag on external EM sovereign index

External sovereigns gained only half as much as their external non-sovereign peers (0.91% vs. 1.83%) and Argentina was the sole source of the underperformance. Argentina suffered a massive sell-off that started when the country’s president came in a distant second in primaries held on August 11. (p 38)

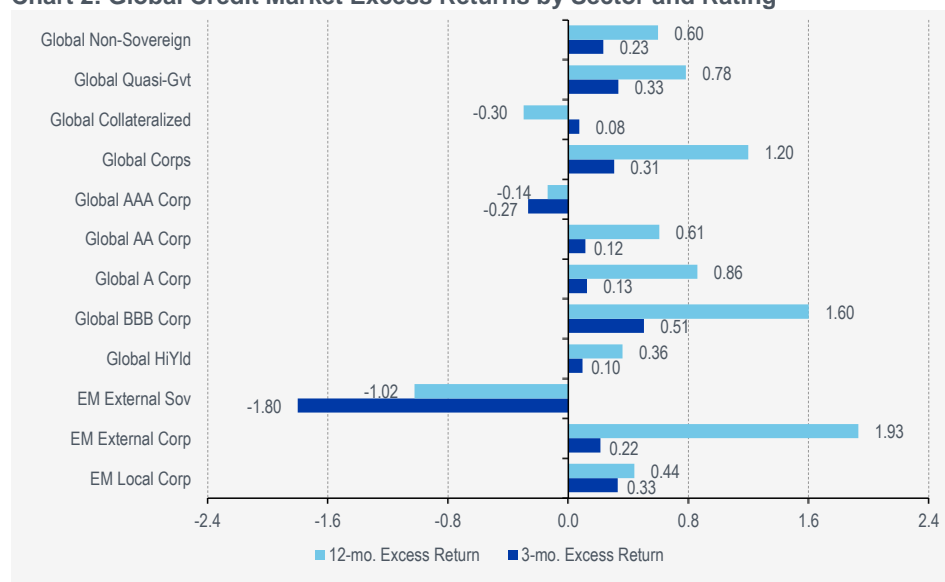
# Global credit markets at a glance

*The global bond markets continued to post strong gains in Q3 with most segments scoring returns in the 2-3% range. High yield and Emerging Markets were two notable exceptions to that rule though, with the exception of local EM corporates, they too were comfortably in the black. The big performance driver in Q3 was the curve. Excess returns were fairly muted relative to Q2's results but, with the exception of external EM sovereigns, they were mostly positive.*

**Chart 1: Global Credit Market Total Returns by Sector and Rating (local currency terms)**

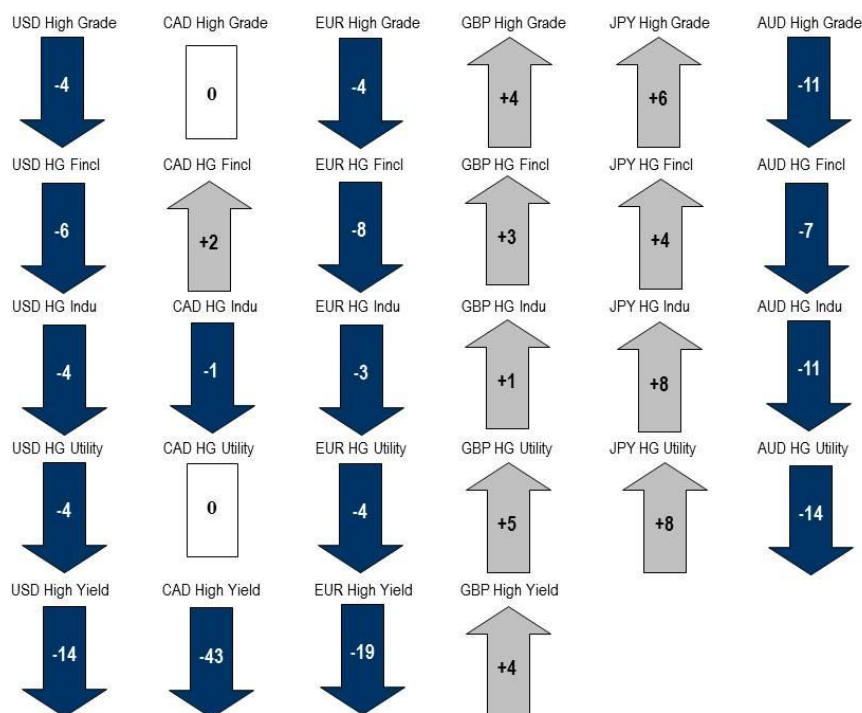


**Chart 2: Global Credit Market Excess Returns by Sector and Rating**



*Spreads were mixed in Q3, with rallies in some currencies (USD, EUR, AUD), but widening in GBP and JPY.*

**Chart 3: Quarterly change in spread by currency/sector (excluding rebalancing impact)**



**Table 1: Global Spread Recap**

Spreads vs Govts	30-Sep-19						3-Month Change					
	All Investment Grade	AAA	AA	A	BBB	High Yield	All Investment Grade	AAA	AA	A	BBB	High Yield
USD	122	65	62	94	156	402	0	3	-5	0	-1	-5
EUR	112	67	71	94	135	366	-2	4	3	2	-7	-5
GBP	152	70	82	134	192	517	5	3	3	7	5	35
CAD	126	49	69	114	161	342	4	-7	6	3	3	-31
AUD	103	65	73	111	132	n.a.	-5	-10	-6	-5	-4	n.a.
JPY	58	n.a.	46	59	75	n.a.	7	n.a.	11	7	3	n.a.

After picking up in Q2, the pace of high grade rating changes slowed significantly in Q3, with \$285bn in rating changes vs. roughly \$400bn the prior quarter. One consistent feature was the bias, which remained towards downgrades.

**Table 2: Global High Grade Corporate Index Rating Migrations**

Quarter	Total	Downgrades		Upgrades		Fallen Angels		Defaults	
	#Issuers	#Issuers	%	#Issuers	%	# Issuers	%	#Issuers	%
Global	2,163	23	1.1	39	1.8	3	0.1	0	0.0
USD	1,173	11	0.9	24	2.0	2	0.2	0	0.0
Pan-Europe	845	13	1.5	14	1.7	1	0.1	0	0.0
EUR	707	10	1.4	13	1.8	1	0.1	0	0.0
GBP	314	8	2.5	5	1.6	1	0.3	0	0.0
JPY	91	2	2.2	0	0.0	0	0.0	0	0.0
CAD	180	4	2.2	2	1.1	1	0.6	0	0.0
AUD	141	1	0.7	1	0.7	0	0.0	0	0.0
	\$ParVal	\$ParVal	%	\$ParVal	%	\$ParVal	%	\$ParVal	%
Global	10,834,548	171,306	1.6	113,874	1.1	7,766	0.1	0	0.0
USD	6,754,642	113,174	1.7	73,219	1.1	2,600	0.0	0	0.0
Pan-Europe	3,139,231	47,995	1.5	35,052	1.1	3,483	0.1	0	0.0
EUR	2,701,944	38,422	1.4	30,882	1.1	2,847	0.1	0	0.0
GBP	437,287	9,574	2.2	4,171	1.0	636	0.1	0	0.0
JPY	150,817	761	0.5	0	0.0	0	0.0	0	0.0
CAD	334,310	4,745	1.4	926	0.3	383	0.1	0	0.0
AUD	72,177	667	0.9	421	0.6	0	0.0	0	0.0
	# Bonds	# Bonds	%	# Bonds	%	# Bonds	%	# Bonds	%
Global	14,741	196	1.3	165	1.1	8	0.1	0	0.0
USD	8,247	119	1.4	109	1.3	2	0.0	0	0.0
Pan-Europe	4,041	56	1.4	42	1.0	3	0.1	0	0.0
EUR	3,231	42	1.3	36	1.1	2	0.1	0	0.0
GBP	810	14	1.7	6	0.7	1	0.1	0	0.0
JPY	474	4	0.8	0	0.0	0	0.0	0	0.0
CAD	916	9	1.0	5	0.5	2	0.2	0	0.0
AUD	383	2	0.5	1	0.3	0	0.0	0	0.0
Last 12mo	Total	Downgrades		Upgrades		Fallen Angels		Defaults	
	#Issuers	# Issuers	%	# Issuers	%	# Issuers	%	#Issuers	%
Global	2,259	146	6.5	165	7.3	32	1.4	1	0.0
USD	1,218	76	6.2	100	8.2	18	1.5	1	0.1
Pan-Europe	875	65	7.4	70	8.0	8	0.9	0	0.0
EUR	731	54	7.4	65	8.9	7	1.0	0	0.0
GBP	327	30	9.2	18	5.5	3	0.9	0	0.0
JPY	97	10	10.3	3	3.1	0	0.0	0	0.0
CAD	187	20	10.7	10	5.3	2	1.1	0	0.0
AUD	152	5	3.3	7	4.6	0	0.0	0	0.0
	\$ParVal	\$ParVal	%	\$ParVal	%	\$ParVal	%	\$ParVal	%
Global	12,010,468	788,038	6.6	722,709	6.0	49,062	0.4	17,504	0.1
USD	7,500,174	492,132	6.6	483,336	6.4	34,336	0.5	17,504	0.2
Pan-Europe	3,428,596	243,195	7.1	207,356	6.0	9,886	0.3	0	0.0
EUR	2,953,531	202,687	6.9	190,881	6.5	7,226	0.2	0	0.0
GBP	475,065	40,508	8.5	16,475	3.5	2,660	0.6	0	0.0
JPY	169,484	8,840	5.2	6,744	4.0	0	0.0	0	0.0
CAD	374,992	23,330	6.2	11,665	3.1	891	0.2	0	0.0
AUD	86,769	3,582	4.1	3,152	3.6	0	0.0	0	0.0
	# Bonds	# Bonds	%	# Bonds	%	# Bonds	%	# Bonds	%
Global	16,247	998	6.1	957	5.9	79	0.5	29	0.2
USD	9,095	561	6.2	606	6.7	53	0.6	29	0.3
Pan-Europe	4,351	289	6.6	257	5.9	14	0.3	0	0.0
EUR	3,481	216	6.2	226	6.5	9	0.3	0	0.0
GBP	870	73	8.4	31	3.6	5	0.6	0	0.0
JPY	545	29	5.3	18	3.3	0	0.0	0	0.0
CAD	1,004	78	7.8	42	4.2	5	0.5	0	0.0
AUD	452	11	2.4	15	3.3	0	0.0	0	0.0

Note: Analysis based on the Global Broad Market Corporate Index (G0BC) over the periods indicated.

*While high yield rating migrations also picked up, there was a much more dramatic shift to downgrades.*

**Table 3: Global High Yield Corporate Index rating migrations**

Quarter	Total	Downgrades		Upgrades		Rising Stars		Defaults	
	# Issuers	# Issuers	%	# Issuers	%	# Issuers	%	# Issuers	%
Global	1,130	76	6.7	35	3.1	6	0.5	6	0.5
USD	866	64	7.4	28	3.2	4	0.5	4	0.5
Pan-Europe	342	18	5.3	7	2.0	3	0.9	2	0.6
EUR	294	15	5.1	7	2.4	3	1.0	2	0.7
GBP	63	4	6.3	0	0.0	0	0.0	0	0.0
CAD	22	0	0.0	3	13.6	1	4.5	0	0.0
	<b>\$ParVal</b>	<b>\$ParVal</b>	<b>%</b>	<b>\$ParVal</b>	<b>%</b>	<b>\$ParVal</b>	<b>%</b>	<b>\$ParVal</b>	<b>%</b>
Global	1,642,671	121,022	7.4	52,548	3.2	13,046	0.8	11,116	0.7
USD	1,259,821	106,969	8.5	39,196	3.1	4,200	0.3	9,525	0.8
Pan-Europe	375,555	14,053	3.7	12,663	3.4	8,693	2.3	1,591	0.4
EUR	334,446	11,310	3.4	12,663	3.8	8,693	2.6	1,591	0.5
GBP	41,109	2,743	6.7	0	0.0	0	0.0	0	0.0
CAD	7,295	0	0.0	689	9.4	153	2.1	0	0.0
	<b># Bonds</b>	<b># Bonds</b>	<b>%</b>	<b># Bonds</b>	<b>%</b>	<b># Bonds</b>	<b>%</b>	<b># Bonds</b>	<b>%</b>
Global	2,527	194	7.7	71	2.8	17	0.7	20	0.8
USD	1,871	168	9.0	52	2.8	6	0.3	17	0.9
Pan-Europe	621	26	4.2	16	2.6	10	1.6	3	0.5
EUR	523	20	3.8	16	3.1	10	1.9	3	0.6
GBP	98	6	6.1	0	0.0	0	0.0	0	0.0
CAD	35	0	0.0	3	8.6	1	2.9	0	0.0
Last 12mo	Total	Downgrades		Upgrades		Rising Stars		Defaults	
	# Issuers	# Issuers	%	# Issuers	%	# Issuers	%	# Issuers	%
Global	1,246	201	16.1	158	12.7	29	2.3	23	1.8
USD	950	156	16.4	126	13.3	23	2.4	18	1.9
Pan-Europe	380	53	13.9	43	11.3	10	2.6	5	1.3
EUR	324	40	12.3	42	13.0	10	3.1	4	1.2
GBP	75	15	20.0	3	4.0	1	1.3	1	1.3
CAD	24	2	8.3	5	20.8	2	8.3	0	0.0
	<b>\$ParVal</b>	<b>\$ParVal</b>	<b>%</b>	<b>\$ParVal</b>	<b>%</b>	<b>\$ParVal</b>	<b>%</b>	<b>\$ParVal</b>	<b>%</b>
Global	1,922,247	246,070	12.8	257,820	13.4	69,068	3.6	25,460	1.3
USD	1,471,402	199,629	13.6	204,574	13.9	49,383	3.4	21,561	1.5
Pan-Europe	441,165	46,093	10.4	49,242	11.2	17,674	4.0	3,898	0.9
EUR	389,575	37,513	9.6	46,951	12.1	16,282	4.2	2,755	0.7
GBP	51,590	8,580	16.6	2,291	4.4	1,392	2.7	1,143	2.2
CAD	9,680	348	3.6	4,004	41.4	2,011	20.8	0	0.0
	<b># Bonds</b>	<b># Bonds</b>	<b>%</b>	<b># Bonds</b>	<b>%</b>	<b># Bonds</b>	<b>%</b>	<b># Bonds</b>	<b>%</b>
Global	2,943	406	13.8	356	12.1	88	3.0	48	1.6
USD	2,183	322	14.8	270	12.4	58	2.7	40	1.8
Pan-Europe	722	82	11.4	76	10.5	27	3.7	8	1.1
EUR	600	62	10.3	71	11.8	24	4.0	6	1.0
GBP	122	20	16.4	5	4.1	3	2.5	2	1.6
CAD	38	2	5.3	10	26.3	3	7.9	0	0.0

Note: Analysis based on the Global High Yield Index (HW00) over the periods indicated.

*Totaling \$7bn in Q3, the volume of fallen angels was little changed QoQ after a two-quarter modest uptick.*

**Table 4: Fallen Angels Entering the Global High Yield Indices**  
(face value USD terms in millions)

	USD	EUR	GBP	CAD	Global
<b>Q3 2016</b>	<b>25,440</b>	<b>562</b>	-	-	<b>26,002</b>
Oct	5,350	1,688	-	-	7,038
Nov	1,150	-	-	-	1,150
Dec	4,900	-	-	-	4,900
<b>Q4 2016</b>	<b>11,400</b>	<b>1,688</b>	-	-	<b>13,088</b>
<b>2016</b>	<b>143,997</b>	<b>20,281</b>	<b>494</b>	<b>-</b>	<b>164,772</b>
Jan	1,950	-	-	-	1,950
Feb	7,800	535	-	-	8,335
Mar	-	-	-	-	-
<b>Q1 2017</b>	<b>9,750</b>	<b>535</b>	-	-	<b>10,285</b>
Apr	1,200	-	-	-	1,200
May	1,000	2,566	-	-	3,566
Jun	3,927	2,965	-	-	6,892
<b>Q2 2017</b>	<b>6,127</b>	<b>5,531</b>	-	-	<b>11,658</b>
Jul	1,000	1,182	-	-	2,182
Aug	1,100	-	-	-	1,100
Sep	-	-	-	-	-
<b>Q3 2017</b>	<b>2,100</b>	<b>1,182</b>	-	-	<b>3,282</b>
Oct	4,580	2,402	-	-	6,982
Nov	22,346	8,406	-	-	30,752
Dec	1,750	961	566	-	3,277
<b>Q4 2017</b>	<b>28,676</b>	<b>11,769</b>	<b>566</b>	<b>-</b>	<b>41,011</b>
<b>2017</b>	<b>46,653</b>	<b>19,394</b>	<b>566</b>	<b>-</b>	<b>66,613</b>
Jan	625	-	-	-	625
Feb	2,175	-	-	-	2,175
Mar	5,700	615	-	-	6,315
<b>Q1 2018</b>	<b>8,500</b>	<b>615</b>	-	-	<b>9,115</b>
Apr	1,400	759	209	-	2,368
May	5,000	1,518	561	-	7,079
Jun	2,350	-	-	-	2,350
<b>Q2 2018</b>	<b>8,750</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>11,797</b>
Jul	4,600	-	-	-	4,600
Aug	950	581	-	-	1,531
Sep	350	-	-	-	350
<b>Q3 2018</b>	<b>5,900</b>	<b>581</b>	-	-	<b>6,481</b>
Oct	1,500	686	1,401	-	3,587
Nov	1,000	-	-	-	1,000
Dec	7,337	-	-	-	7,337
<b>Q4 2018</b>	<b>9,837</b>	<b>686</b>	<b>1,401</b>	<b>-</b>	<b>11,924</b>
<b>2018</b>	<b>27,987</b>	<b>2,573</b>	<b>1,602</b>	<b>-</b>	<b>32,162</b>
Jan	10,741	-	-	-	10,741
Feb	1,340	-	-	-	1,340
Mar	1,400	-	-	-	1,400
<b>Q1 2019</b>	<b>13,481</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>13,481</b>
Apr	850	1,196	573	-	2,619
May	1,350	-	-	-	1,350
Jun	1,638	2,449	-	-	4,087
<b>Q2 2019</b>	<b>3,838</b>	<b>3,645</b>	<b>573</b>	<b>-</b>	<b>8,056</b>
Jul	-	-	-	-	-
Aug	3,900	2,784	612	-	7,296
Sep	-	-	-	-	-
<b>Q3 2019</b>	<b>3,900</b>	<b>2,784</b>	<b>612</b>	<b>-</b>	<b>7,296</b>

Source: ICE BofAML Global Investment Grade Corporate (G0BC) and Global High Yield (HW00) Indices.

*Defaults have been picking up each quarter so far in 2019, with Q3 totaling \$11bn – the largest since Q1-18.*

**Table 5: Defaults**  
(face value USD terms in millions)

	USD	EUR	GBP	CAD	Global
<b>Q3 2016</b>	<b>5,835</b>	<b>393</b>	-	-	<b>6,228</b>
Oct	2,039	-	-	-	2,039
Nov	1,003	334	-	-	1,337
Dec	1,600	-	-	-	1,600
<b>Q4 2016</b>	<b>4,642</b>	<b>334</b>	-	-	<b>4,976</b>
<b>2016</b>	<b>39,365</b>	<b>6,189</b>	-	<b>130</b>	<b>45,684</b>
Jan	5,061	-	-	-	5,061
Feb	382	-	-	-	382
Mar	-	-	-	-	-
<b>Q1 2017</b>	<b>5,443</b>	-	-	-	<b>5,443</b>
Apr	-	-	-	-	-
May	1,393	-	-	-	1,393
Jun	1,830	-	-	-	1,830
<b>Q2 2017</b>	<b>3,223</b>	-	-	-	<b>3,223</b>
Jul	-	1,212	-	-	1,212
Aug	-	-	-	-	-
Sep	1,117	-	-	-	1,117
<b>Q3 2017</b>	<b>1,117</b>	<b>1,212</b>	-	-	<b>2,329</b>
Oct	500	-	-	-	500
Nov	2,040	-	-	-	2,040
Dec	1,149	-	-	-	1,149
<b>Q4 2017</b>	<b>3,689</b>	-	-	-	<b>3,689</b>
<b>2017</b>	<b>13,472</b>	<b>1,231</b>	-	-	<b>14,703</b>
Jan	1,390	357	982	-	2,729
Feb	2,997	-	233	-	3,230
Mar	8,748	-	-	-	8,748
<b>Q1 2018</b>	<b>13,135</b>	<b>357</b>	<b>1,215</b>	-	<b>14,707</b>
Apr	1,671	-	-	-	1,671
May	-	-	-	-	-
Jun	-	-	-	-	-
<b>Q2 2018</b>	<b>1,671</b>	-	-	-	<b>1,671</b>
Jul	-	-	-	-	-
Aug	-	-	-	-	-
Sep	-	-	-	-	-
<b>Q3 2018</b>	-	-	-	-	-
43,385	1,811	-	-	-	1,811
43,416	525	-	-	-	525
43,446	1,460	657	-	-	2,117
<b>Q4 2018</b>	<b>3,796</b>	<b>657</b>	-	-	<b>4,453</b>
<b>2018</b>	<b>18,602</b>	<b>988</b>	<b>1,102</b>	-	<b>20,692</b>
Jan	-	-	-	-	-
Feb	2,616	-	-	-	2,616
Mar	-	-	-	-	-
<b>Q1 2019</b>	<b>2,616</b>	-	-	-	<b>2,616</b>
Apr	3,858	-	-	-	3,858
May	1,467	456	-	-	1,923
Jun	300	-	1,102	-	1,402
<b>Q2 2019</b>	<b>5,625</b>	<b>456</b>	<b>1,102</b>	-	<b>7,183</b>
Jul	6,151	285	-	-	6,436
Aug	2,874	-	-	-	2,874
Sep	500	1,266	-	-	1,766
<b>Q3 2019</b>	<b>9,525</b>	<b>1,551</b>	-	-	<b>11,076</b>

Source: ICE BofAML Global Investment Grade Corporate (G0BC) and Global High Yield (HW00) Indices.

# US High Grade

*In Q3 the US Broad Market Index fell way off its H1 pace but at 2.28% it still earned half a percent more than its average quarterly return since inception.*

After posting two straight quarterly returns of about 3% in the first half of the year, the US Broad Market Index slumped in Q3 as it gained “only” 2.38%. That is a significant drop-off from the prior two quarters but at the same time Q3’s 2.38% is a little more than half a percent better than the index’s average quarterly return since its inception in 1976 (1.83%). With the impressive string of performances over the year’s first three quarters, if the index earns only half as much in Q4 as it did in Q3 it will record its first double digit full year return in 17 years.

*This was only the fourth time in its 44 year history that the Index posted three straight 2+% quarterly returns.*

This is only the fourth time in its 44 year history, and the first time in over ten years, that the index posted three consecutive quarterly returns over the 2% mark. It is also worth highlighting the fact that the index has never gained more than 2% in four consecutive quarters, so the odds are that we will see bond returns decline again in Q4. But will they turn negative? There are many factors that will ultimately determine the answer to that question, but past history does not suggest that a quarterly loss is necessarily imminent.

Of the three prior occurrences, the index followed three 2+% quarterly returns with a positive return twice and a negative return once (Exhibit A). However, that one loss came after an 11% 9 month return, just as we have seen in 2019, whereas the two gains came after 9 month returns of less than 10%. Looking farther down the road, in each case the index was in the black for the 12 months following the large three quarterly rallies, though once again the return was comparatively weak in the 12 months following the June 30, 2007 to March 31, 2008 rally. Bond market total returns may have been positive during the following year, but credit market performance was another story. In two of the three observations the subsequent Corporate Index 12 month excess return was deep in the red, including the -15.66% excess return recorded during the height of financial crisis from 3/31/2008 to 3/31/2009.

**Exhibit A: index performance during and after large three-quarter rallies**

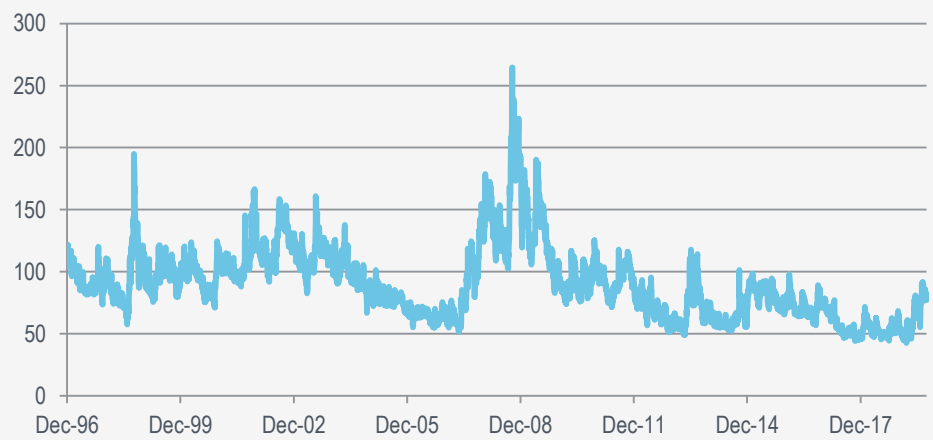
Three quarters ended:	Broad Index 9 month total return	Broad Index total return in the next quarter	Broad Index total return in the next year	Corporate Index excess return in the next year
12/31/1997	9.53	1.62	8.83	(2.22)
3/31/2001	6.34	0.43	5.18	1.55
3/31/2008	11.06	(1.07)	2.45	(15.66)
9/30/2019	11.88			



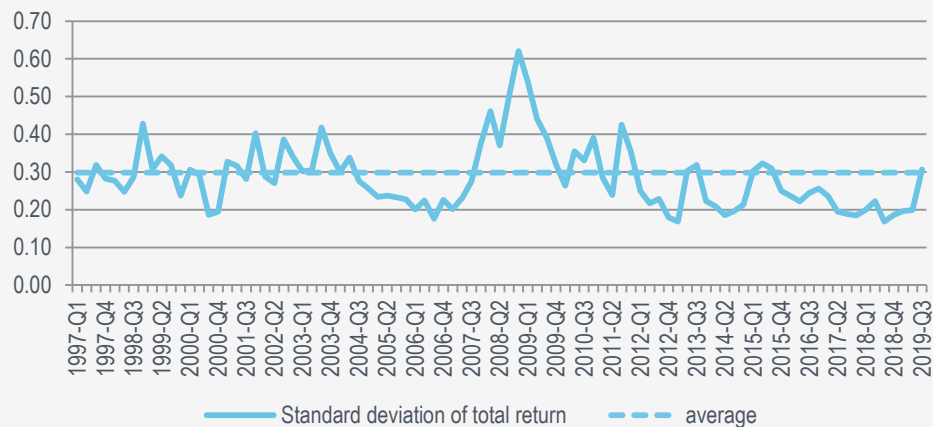
*After hitting a record low in March, the MOVE Index is now toward the upper end of its post financial crisis range.*

After a long stretch of subdued volatility the markets have been heating up. The MOVE index – a key barometer of fixed income volatility – hit a record low of 42.53 in March. But since then it has climbed steadily and is now toward the upper end of its post financial crisis range. Similarly, the standard deviation of the US Corporate Index daily total returns jumped from 0.20 or lower in the previous four quarters to 0.31 in Q3 – the highest reading in 16 quarters. But with that move, the Q3 index return volatility is right in line with the standard deviation of daily returns since 1997 (Exhibit C). However, when you decompose the Corporate Index return between its excess return and underlying Treasury return components it becomes clear that underlying Treasury return volatility is well above average, while excess return volatility is still below average (Exhibit D).

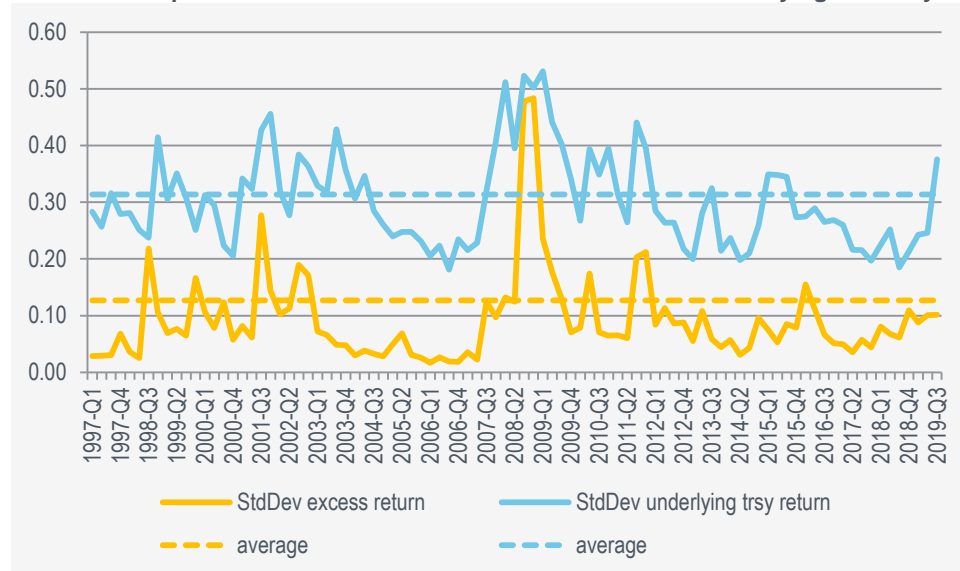
**Exhibit B: ICE BofAML U.S. Bond Market Option Volatility Estimate (“MOVE”) Index**



**Exhibit C: Corporate Index standard deviation of daily total returns**



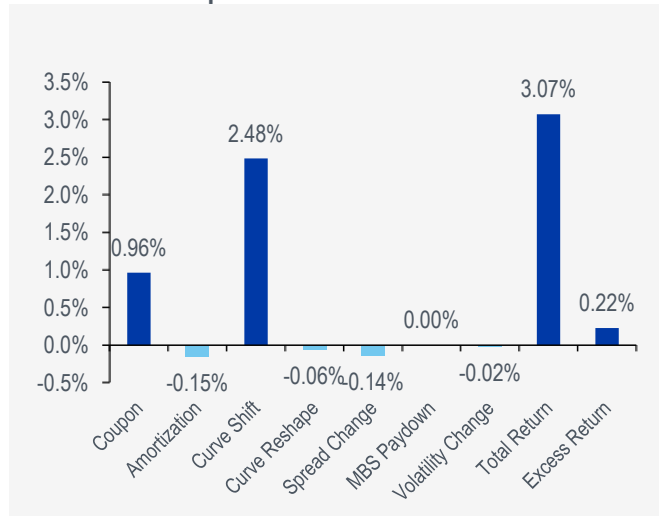
**Exhibit D: Corporate Index standard deviation of excess and underlying Treasury returns**



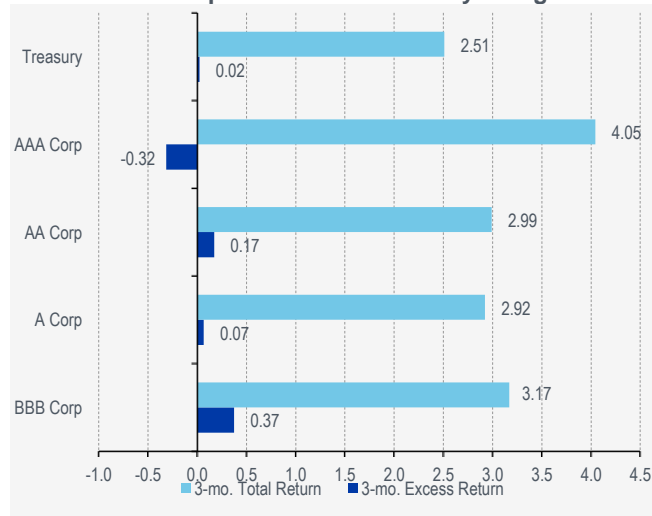
**A 33bp curve rally contributed almost 80% of the Corporate Index Q3 return.**

A 33bp curve rally accounted for almost 80% of the Corporate Index total return in Q3 (2.42% out of 3.07%) with the remaining contribution mostly coming from income. Spread performance was a negligible factor for the quarter though it was slightly in the red, which is not surprising given the strength of the curve rally. With the curve dominating performance during the quarter there was not too much variation in total and excess returns across rating sub-indices. All rating categories suffered minor spread widening losses but BBBs had the best excess return largely due to the income advantage that it holds over higher rated credits (0.45% Q3 income return vs. 0.30% for As, 0.21% for AAs and 0.27% for AAAs).

**Exhibit E: US Corporate Index return attribution**



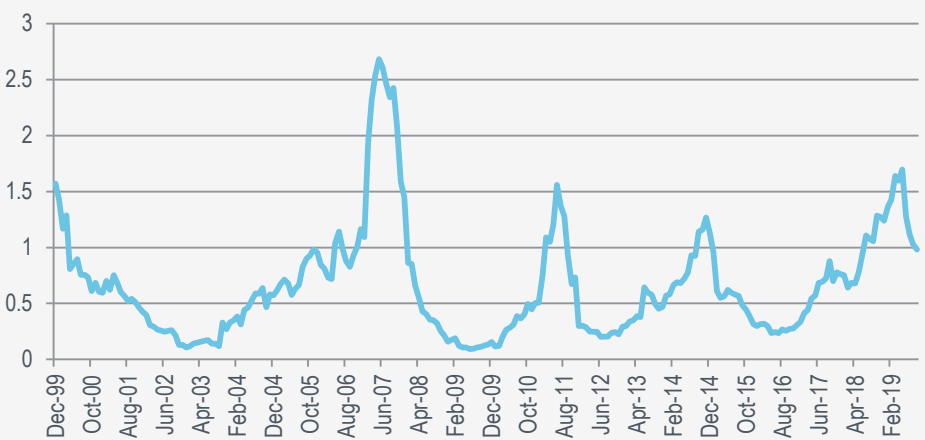
**Exhibit F: US Corporate Index returns by rating**



*The Corporate Index 12-month upgrade/downgrade ratio dipped below the 1.0 mark for the first time in 15 months.*

Corporate Index excess returns were relatively flat in Q3 but rating migrations were not. After upgrades outweighed downgrades by a 2:1 ratio in Q1 (\$170bn upgraded vs. \$84bn downgraded), and the two were relatively even in Q2 (\$111bn upgraded vs. \$119bn downgraded), the pendulum continued to swing in Q3 as upgrades dropped to just \$73bn, while downgrades held fairly steady at \$113bn. At least the downward bias came in a quarter with the lowest total volume of rating changes of the three. But that downturn was enough to drop the 12-month upgrade downgrade ratio below the 1.0 mark for the first time in 15 months (0.98 at the end of September).

**Exhibit G: Corporate Index 12-month upgrade/downgrade ratio**



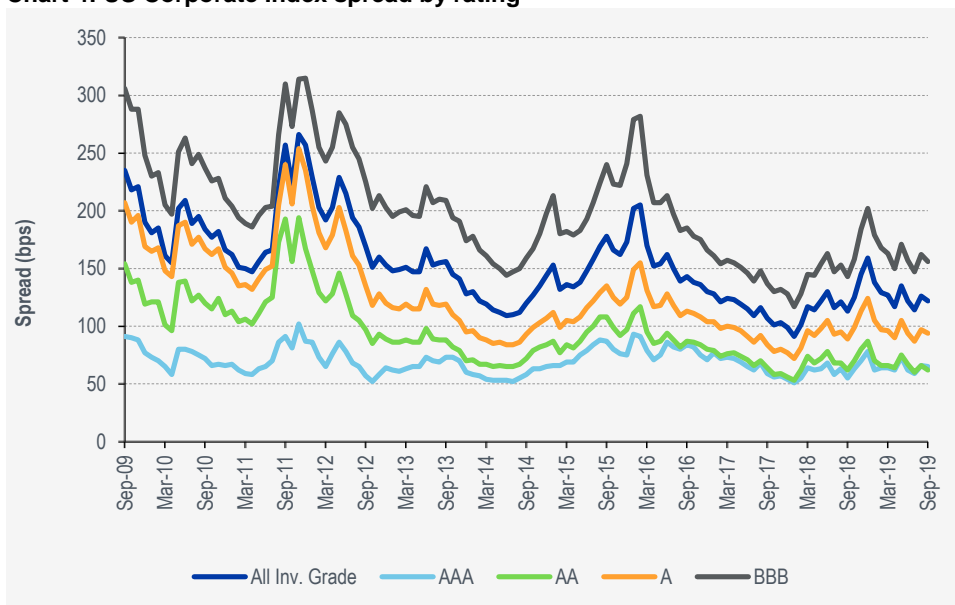
**Exhibit H: US spread & excess return by sector**

Sector	%wt*	Eff.Dur.	Option-Adjusted Spread (OAS)						Excess return %							
			Current	QoQ	YoY	Current spread multiple vs			Annualized					Information ratio		
						10yr high	10yr low	10yr avg	3mo	1yr	3yrs	5yrs	10yrs	3yrs	5yrs	10yrs
US Corp Index	26.6	7.60	122	0	9	0.5	1.3	0.8	0.22	0.73	2.05	1.25	2.02	0.21	0.11	0.17
Banking	5.8	5.14	101	-1	-1	0.3	1.3	0.6	0.23	1.61	2.06	1.56	2.51	0.27	0.20	0.20
Financial Services	2.5	5.99	121	-3	1	0.4	1.2	0.7	0.56	1.32	2.32	1.81	2.93	0.37	0.25	0.26
Insurance	4.1	8.64	134	-1	9	0.4	1.3	0.8	0.26	1.12	2.69	1.60	3.41	0.29	0.15	0.25
Automotive	2.6	4.28	134	2	24	0.5	1.9	1.0	-0.01	0.31	1.11	0.94	2.04	0.13	0.11	0.26
Basic Industry	4.6	7.76	165	1	20	0.4	1.5	0.9	0.16	0.69	2.86	1.24	1.95	0.25	0.06	0.12
Capital Goods	4.7	7.74	103	-4	10	0.6	1.4	0.9	0.37	0.25	1.14	0.83	1.40	0.11	0.09	0.17
Consumer Goods	6.3	8.16	119	-1	17	0.7	1.5	1.0	0.36	0.80	1.22	1.21	1.61	0.12	0.12	0.18
Energy	11.4	7.87	168	2	27	0.5	1.4	0.9	-0.06	-0.67	2.84	0.74	1.70	0.21	0.03	0.10
Healthcare	9.1	8.80	110	1	16	0.7	1.4	1.0	0.15	0.14	1.57	1.20	1.42	0.16	0.12	0.15
Leisure	0.4	4.82	142	-8	-7	0.4	1.4	0.8	1.06	2.33	2.21	1.75	3.05	0.30	0.23	0.39
Media	3.2	9.26	137	1	-4	0.6	1.2	0.8	0.09	1.57	2.41	1.52	2.23	0.17	0.10	0.14
Real Estate	2.5	6.46	119	-1	-1	0.3	1.2	0.7	0.65	1.76	2.35	1.85	3.39	0.39	0.28	0.33
Retail	3.2	8.91	99	-1	0	0.6	1.2	0.8	0.21	0.42	1.61	1.24	1.56	0.15	0.11	0.14
Services	1.1	10.07	106	-2	-1	0.6	1.1	0.8	0.45	1.22	2.20	1.62	1.99	0.36	0.25	0.27
Technology & Electronics	7.5	7.66	94	-5	12	0.6	1.3	0.9	0.32	0.52	2.06	1.48	1.51	0.22	0.15	0.17
Telecommunications	4.3	9.68	142	-2	-4	0.6	1.1	0.8	0.34	3.00	3.01	2.13	2.17	0.19	0.12	0.13
Transportation	2.4	10.08	130	5	13	0.6	1.4	0.9	-0.56	-0.44	1.70	1.21	1.98	0.14	0.10	0.19
Utility	8.3	9.92	125	-3	5	0.6	1.3	0.9	0.42	-0.50	1.66	0.90	1.50	0.16	0.09	0.15
Foreign Govt. and Supras	4.6	5.61	63	-3	0	0.4	1.1	0.7	0.38	1.05	1.19	0.75	1.03	0.24	0.12	0.16
US Agencies	1.2	4.19	11	-2	-3	0.3	1.6	0.6	0.15	0.20	0.44	0.36	0.43	0.52	0.42	0.33
Taxable Munis	0.7	11.12	116	-1	7	0.5	1.1	0.7	0.30	0.40	2.84	1.89	na	0.38	0.19	na
MBS	23.0	3.09	55	0	22	0.8	-2.9	1.7	0.00	-0.70	0.03	0.08	0.54	0.03	0.04	0.13
ABS	1.4	2.14	73	5	15	0.3	1.4	0.8	0.08	0.29	0.91	0.83	1.31	0.77	0.63	0.58
CMBS	1.8	4.88	84	-1	6	0.2	1.1	0.5	0.33	0.77	1.45	1.28	3.37	0.41	0.33	0.37

\*Note: Corporate sector weights based on share of US Corporate Index (C0A0); others based on share of US Broad Market Index (US00)

*The overall Corporate Index spread was unchanged QoQ, but the underlying rating segments were uneven, with BBB's and AAs tightening (-1% and -7%, respectively).*

**Chart 4: US Corporate Index spread by rating**



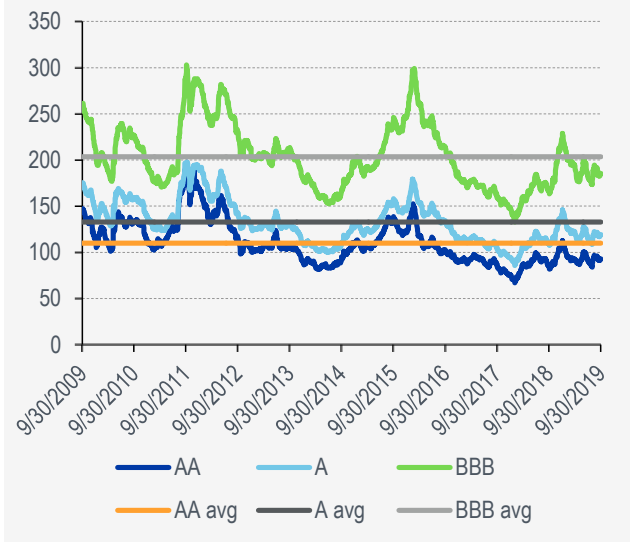
*Spreads are a little higher than where they were a year ago, except for AAs, which are unchanged.*

**Chart 5: US Corporate Index spread range (last 10 Years)**

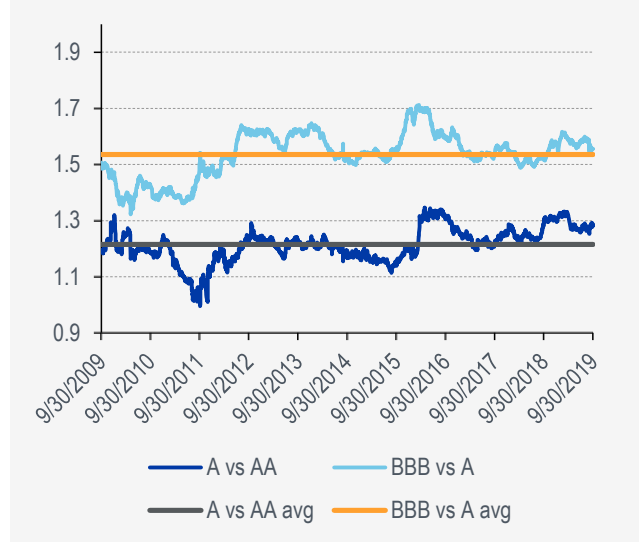


*10 year spreads for each rating segment remain below their long-term averages. But while the BBB-A spread multiple is now in line with its 10-year average the A-AA multiple remains slightly above average.*

**Chart 6: 10 year maturity USD corporate spreads**



**Chart 7: 10 year maturity USD corporate spread multiples**



*While 5-year Sharpe ratios mostly rose QoQ, the 10-year ratios fell by roughly the same amount. Fixed-rate ABS has now decisively taken over the top-ranking for both 5- and 10-year Sharpe ratios.*

Table 6: US 5- and 10-Year Sharpe ratios (as of 30 Sep 2019)

Index	Ticker	Ann. Total Return		Ann. S.D.		Sharpe Ratio		Chg QoQ	
		5Yrs	10Yrs	5Yrs	10Yrs	5Yrs	10Yrs	5Yrs	10Yrs
3-Month Treasury Bill	G001	0.98	0.54	0.26	0.23				
US Broad Market	US00	3.46	3.84	3.15	3.03	0.23	0.31	0.02	-0.03
Corp/Govt Master	B0A0	3.68	4.01	3.61	3.47	0.22	0.29	0.02	-0.03
US Treasury	G0Q0	3.06	3.16	3.90	3.82	0.16	0.20	0.01	-0.01
1-3 Yr	G1O2	1.32	1.18	0.93	0.86	0.11	0.21	-0.01	-0.03
3-5 Yr	G2O2	2.27	2.47	2.39	2.51	0.16	0.22	0.01	-0.02
5-7 Yr	G3O2	3.06	3.50	3.72	4.04	0.16	0.21	0.01	-0.01
7-10 Yr	G4O2	3.71	4.31	5.12	5.55	0.16	0.20	0.01	-0.01
10+ Yr	G9O2	6.62	6.74	10.84	11.07	0.16	0.17	0.01	0.00
1-5 Yr	GVQ0	1.71	1.68	1.52	1.50	0.14	0.22	0.00	-0.02
5-10 Yr	G6O2	3.34	3.86	4.27	4.67	0.16	0.21	0.01	-0.01
1-10 Yr	G5O2	2.20	2.41	2.33	2.50	0.15	0.22	0.01	-0.02
US Agency	G0P0	2.64	2.61	2.30	2.18	0.21	0.27	0.01	-0.02
1-3 Yr	G1P0	1.44	1.30	0.83	0.74	0.16	0.29	-0.01	-0.04
3-5 Yr	G2P0	2.28	2.52	2.02	2.07	0.19	0.28	0.01	-0.02
5-7 Yr	G3P0	3.33	3.82	3.12	3.41	0.22	0.28	0.01	-0.01
7-10 Yr	G4P0	4.46	4.96	4.64	4.60	0.22	0.28	0.01	-0.01
10+ Yr	G9P0	5.90	6.46	7.03	7.56	0.21	0.23	0.01	-0.01
1-5 Yr	GVP0	1.67	1.63	1.11	1.09	0.18	0.29	0.00	-0.03
5-10 Yr	G6P0	3.79	4.26	3.79	3.90	0.21	0.27	0.01	-0.01
1-10 Yr	G5P0	1.95	2.03	1.41	1.47	0.20	0.29	0.00	-0.03
Inv. Grade Corp	C0A0	4.65	5.60	3.91	3.99	0.27	0.36	0.03	-0.03
1-3 Yr	C1A0	2.28	2.71	0.97	1.15	0.38	0.54	0.02	-0.02
3-5 Yr	C2A0	3.41	4.33	2.14	2.59	0.32	0.42	0.03	-0.03
5-7 Yr	C3A0	4.59	5.90	3.22	3.68	0.32	0.41	0.03	-0.03
7-10 Yr	C4A0	5.07	6.32	4.24	4.62	0.28	0.36	0.03	-0.03
10+ Yr	C9A0	6.88	7.93	7.61	7.61	0.23	0.28	0.03	-0.02
1-5 Yr	CVA0	2.82	3.52	1.52	1.85	0.35	0.46	0.03	-0.03
5-10 Yr	C6A0	4.85	6.13	3.79	4.20	0.29	0.38	0.03	-0.03
1-10 Yr	C5A0	3.71	4.73	2.49	2.89	0.31	0.41	0.03	-0.03
AAA	C0A1	5.24	4.78	5.38	4.76	0.23	0.26	0.01	-0.02
AA	C0A2	4.30	4.60	3.62	3.61	0.26	0.32	0.02	-0.03
A	C0A3	4.49	5.25	3.81	3.92	0.27	0.34	0.02	-0.03
BBB	C0A4	4.84	6.29	4.23	4.31	0.26	0.38	0.03	-0.03
Banking	C0P0	4.18	5.36	2.75	3.65	0.33	0.38	0.03	-0.03
Financial Services	CFFS	4.78	6.05	2.92	3.36	0.37	0.46	0.02	-0.03
Insurance	CFIE	5.36	7.20	4.09	4.31	0.31	0.44	0.02	-0.03
All Financials	CF00	4.41	5.70	2.93	3.64	0.33	0.40	0.02	-0.03
Automotive	CIAU	3.29	4.59	2.70	2.74	0.25	0.42	0.02	-0.03
Basic Industry	CIBS	4.76	5.68	5.20	4.96	0.21	0.30	0.03	-0.03
Capital Goods	CICP	4.32	5.04	3.98	3.99	0.24	0.32	0.03	-0.02
Consumer Goods	CICS	4.72	5.23	4.17	4.15	0.25	0.32	0.03	-0.02
Energy	CIEN	4.28	5.56	5.58	5.21	0.17	0.28	0.03	-0.02
Healthcare	CHCR	4.95	5.34	4.62	4.62	0.25	0.30	0.02	-0.02
Leisure	CILE	4.36	5.94	2.93	3.20	0.32	0.47	0.03	-0.02
Media	CIME	5.50	6.39	5.31	5.27	0.25	0.32	0.03	-0.02
Real Estate	CIRE	4.88	6.69	3.35	3.97	0.33	0.44	0.02	-0.03
Retail	CIRL	5.11	5.68	4.81	4.80	0.23	0.30	0.03	-0.02
Services	CISE	5.58	6.24	4.91	4.82	0.26	0.34	0.01	-0.03
Tech & Electronics	CITE	4.81	4.99	3.83	3.79	0.29	0.34	0.03	-0.03
Telecommunications	C0R0	6.17	6.27	5.28	5.05	0.28	0.33	0.03	-0.01
Transportation	C0W0	5.35	6.16	5.16	4.86	0.25	0.33	0.02	-0.03
All Industrials	CI00	4.71	5.54	4.31	4.30	0.25	0.33	0.03	-0.02
Utility	C0Q0	5.08	5.83	5.07	4.97	0.23	0.31	0.02	-0.02
Mortgages	M0A0	2.83	3.17	2.16	2.25	0.25	0.34	0.02	-0.02
FN&FH 30 Yr	MF30	3.08	3.37	2.30	2.35	0.26	0.35	0.02	-0.02
GN 30 Yr	MG1S	2.62	3.24	2.03	2.39	0.23	0.32	0.02	-0.02
All 15 Yr	M15A	2.31	2.50	1.97	1.94	0.19	0.29	0.02	-0.03
CMBS Fixed Rate	CMBS	3.68	5.73	2.69	3.09	0.29	0.48	0.01	0.02
Fixed Rate ABS	R0A0	2.35	2.68	0.94	1.08	0.41	0.56	-0.01	0.01

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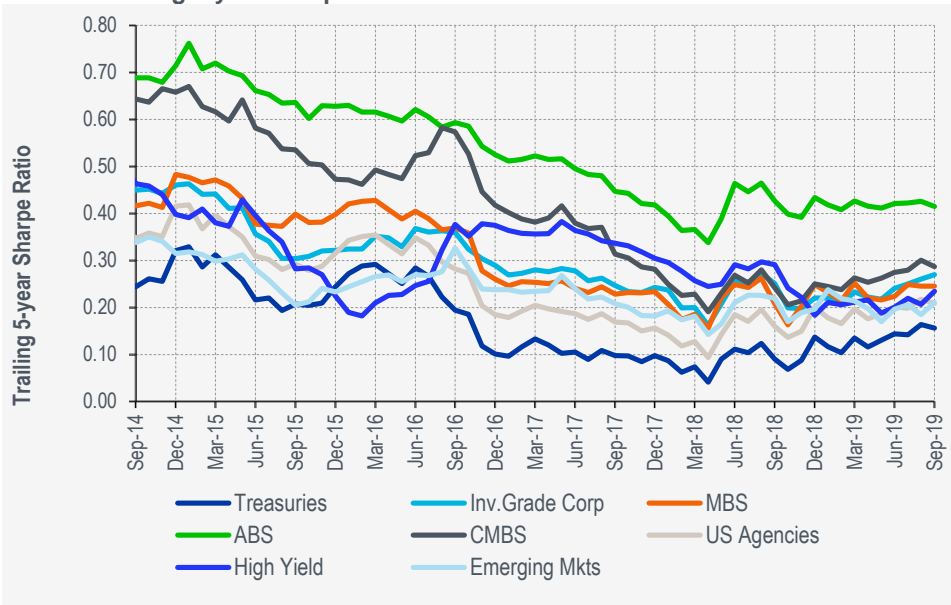
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Reverse highlighted values are the top ranked sectors; shaded values are the bottom ranked sectors.

*ABS has been stable while most other major asset classes have seen their 5-year Sharpe ratios on the rise over the last year.*

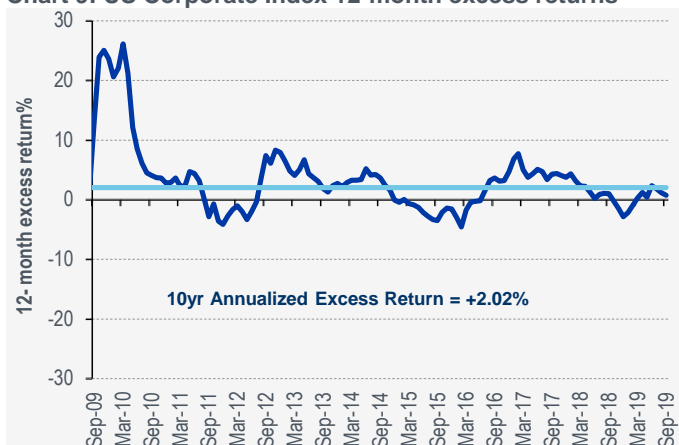
Chart 8: Trailing 5-year Sharpe ratios





*The current 10-year annualized excess return is still a healthy 2.02%, but the more recent 12-month excess return dropped to 0.73% – significantly below the 113bp starting spread of the index.*

**Chart 9: US Corporate Index 12-month excess returns**



**Table 7: US Corporate Index 12-month excess return**

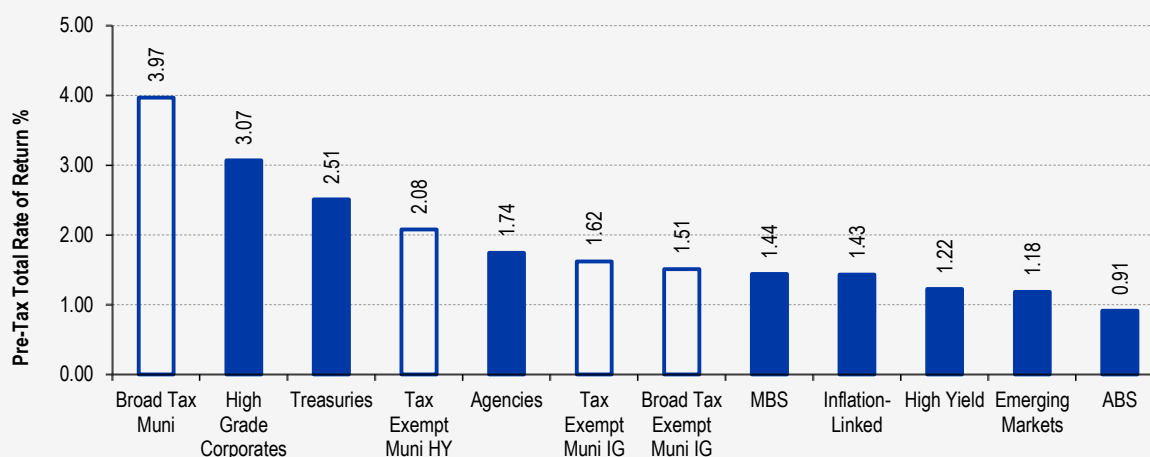
10yr Ann. Excess Return	2.02
Current	0.73
Hi (Mar-10)	26.12
Lo (Feb-16)	-4.55
Std. Dev	5.93

# US Municipals

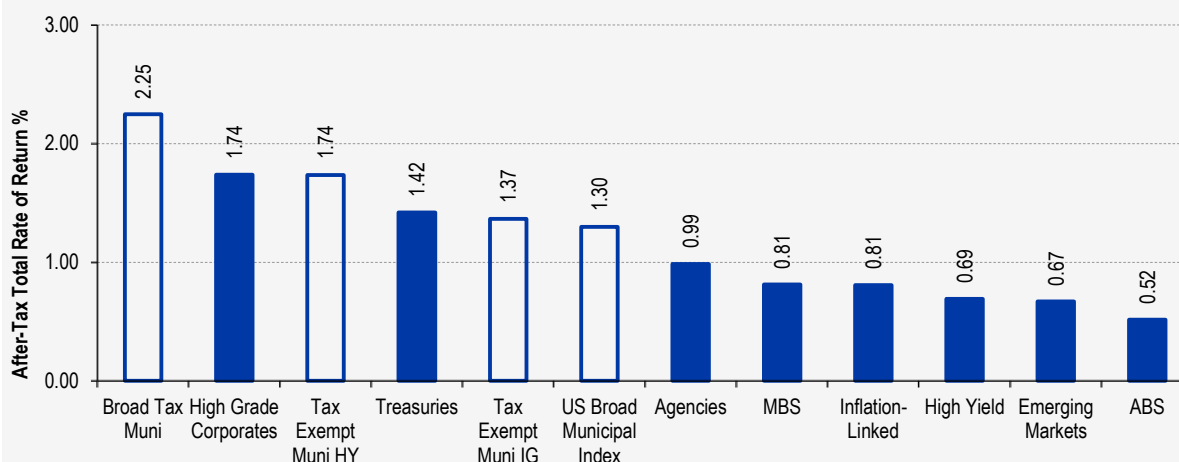
With a duration of over 9 years, the Broad Taxable Muni Index easily rode the 33bp curve rally to the top of the Q3 U.S. bond market rankings. That is the third straight quarter that the taxable muni index has gained roughly 4%. Over its nearly ten year history it has never before gained as much as 3.5% in three straight quarters, so this is an extraordinary performance even for an index with this much duration exposure. Elsewhere in the municipal markets, tax-exempt IG munis gained only about half as much as IG corporates as they placed middle of the pack in the Q3 rankings. Conversely, the muni HY index outpaced HY corporates by a wide margin (2.08% vs. 1.22%).

The comparatively strong performance in the tax-exempt HY index was not driven by extreme performances in just a few issuers. Quite the contrary, returns by state show that only two landed in the red (Oklahoma and Wisconsin) and 40 of the other 50 states/territories gained 1.50% or more. The high yield performance looks even more impressive when adjusted for taxes. At 1.74% the tax-exempt HY muni after tax total return is tied with IG corporates for second in the Q3 rankings, and it is 2.5 times the high yield corporate Q3 after tax return.

**Chart 10: Q3 pre-tax total return**



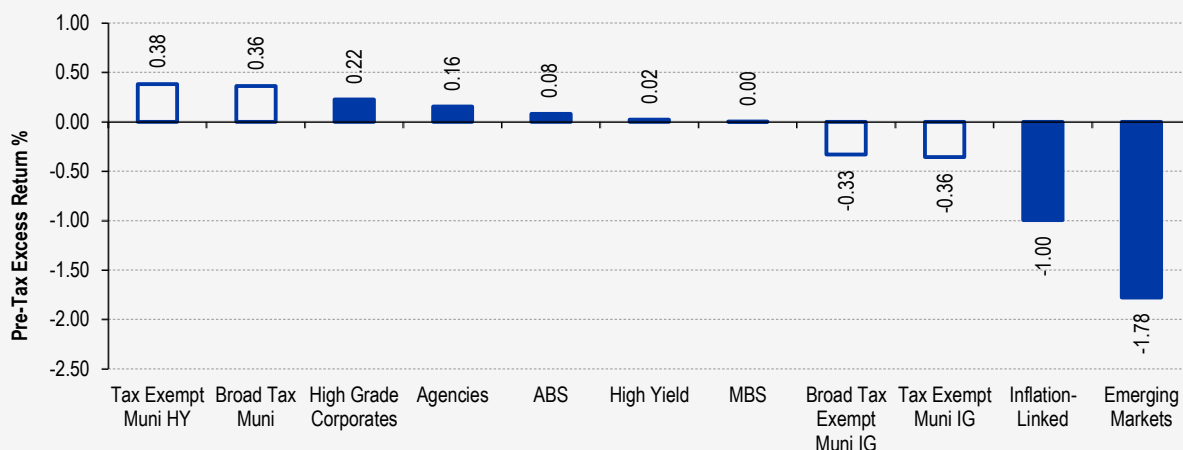
**Chart 11: Q3 after-tax total return (post liquidation method using 43.4% tax rate)**



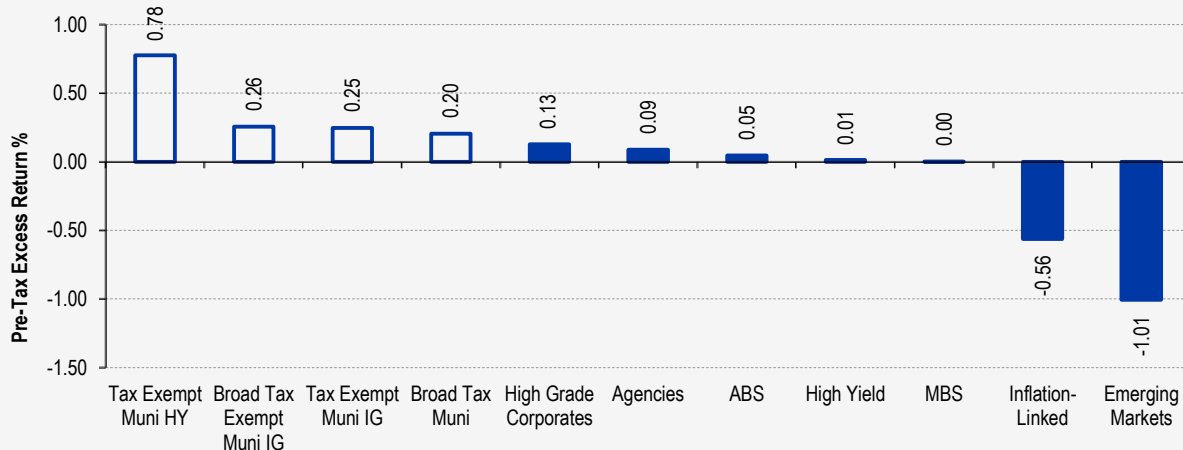
As with most U.S. bond market indices, muni excess returns versus Treasuries – taxable and tax-exempt as well as IG and HY – were relatively mild in Q3. The inflation-linked and EM indices were clear outliers, but if you take away those two it was the muni indices that defined both ends of the risk-adjusted performance spectrum. The tax-exempt HY and Broad taxable IG muni indices were at the top of the rankings with excess returns of 0.38% and 0.36%, respectively. Meanwhile, holding TIPs and EM aside, the tax-exempt IG indices landed at the bottom of the rankings with excess returns that were comparable to the taxable and HY tax-exempt indices in magnitude, if not direction.

Adjusted for taxes, the tax-exempt HY muni index stands out almost as much at the top of the rankings as TIPs and EM do at the bottom. And tax-exempt IG munis jump all the way from third and fourth worst in the pre-tax excess return rankings to second and third best after taxes. This is the second straight quarter that HY munis have led the after-tax excess return rankings. But while they beat next-best EM by just a basis point in Q2 (0.62% vs. 0.61%), in Q3 they roughly tripled the after-tax excess return of second place tax-exempt IG munis (0.78% vs. 0.26%).

**Chart 12: Q3 pre-tax excess return vs Treasuries**



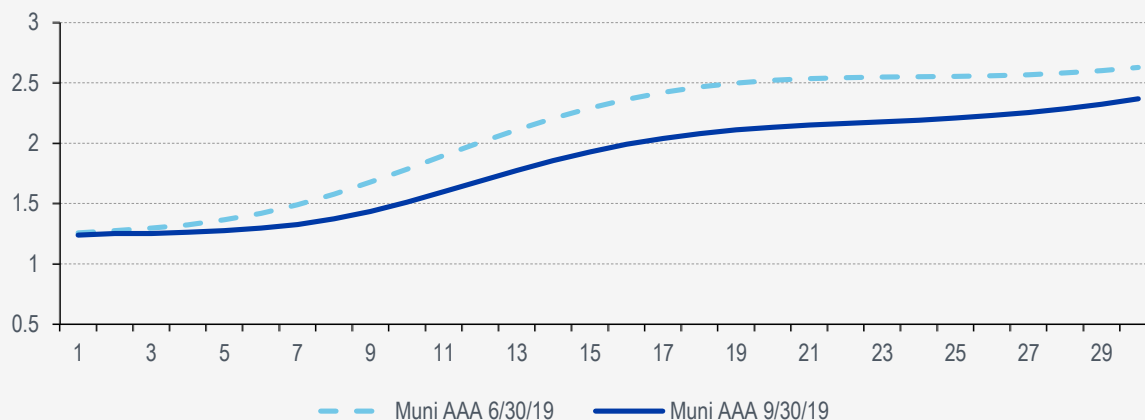
**Chart 13: Q3 after-tax excess return vs Treasuries (post-liquidation method using 43.4% tax rate)**



## Yield Curve

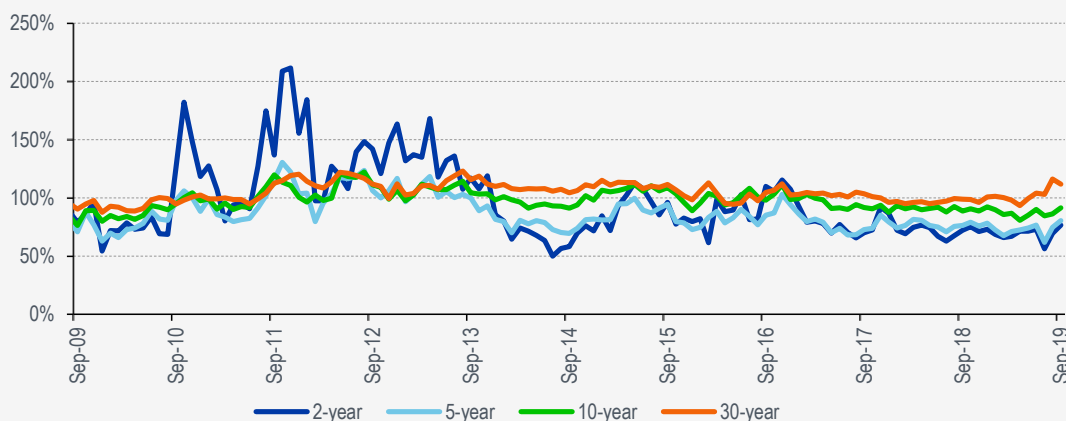
*At 28bp, the AAA GO curve average curve shift came up just a little shy of matching the 33bp rally in the Treasury curve, but relative performances across individual maturity points were not all so close. The AAA GO curve lagged the Treasury rally by 10-15bp in the 2 and 30-year maturity points, but exactly matched Treasuries at the 15-year point.*

**Chart 14: US Municipal AAA GO curve**



*With the wings of the AAA GO curve lagging the Treasury rally, the 2-year yield ratio closed the quarter at its highest level since the end of 2017 and the 30-year yield ratio reached as high as 1.16 in August – its highest level since late 2013 – before closing the quarter at 1.12.*

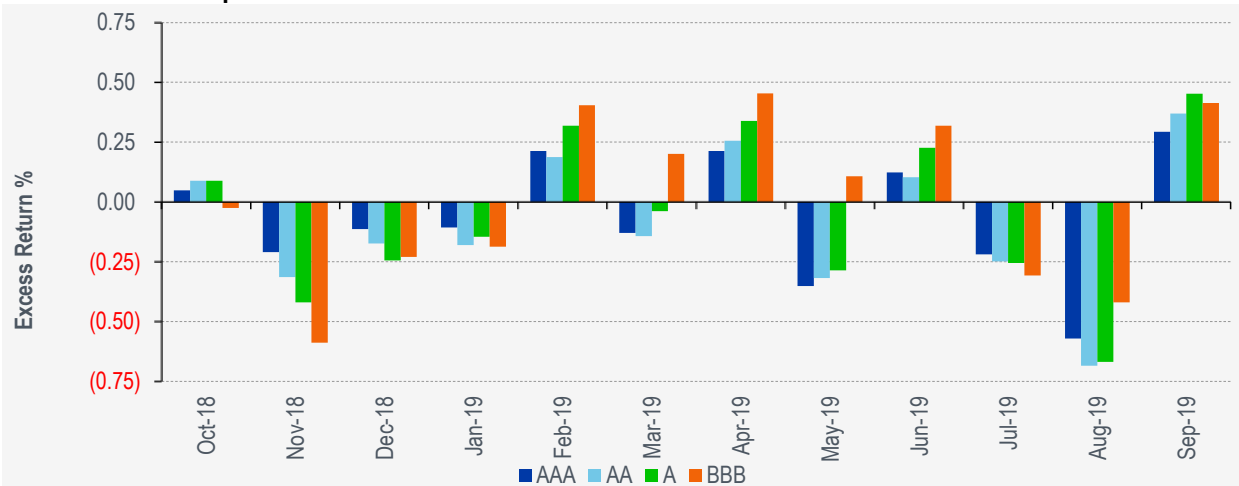
**Chart 15: Tax exempt AAA GO / Treasury yield ratios**



## Rating

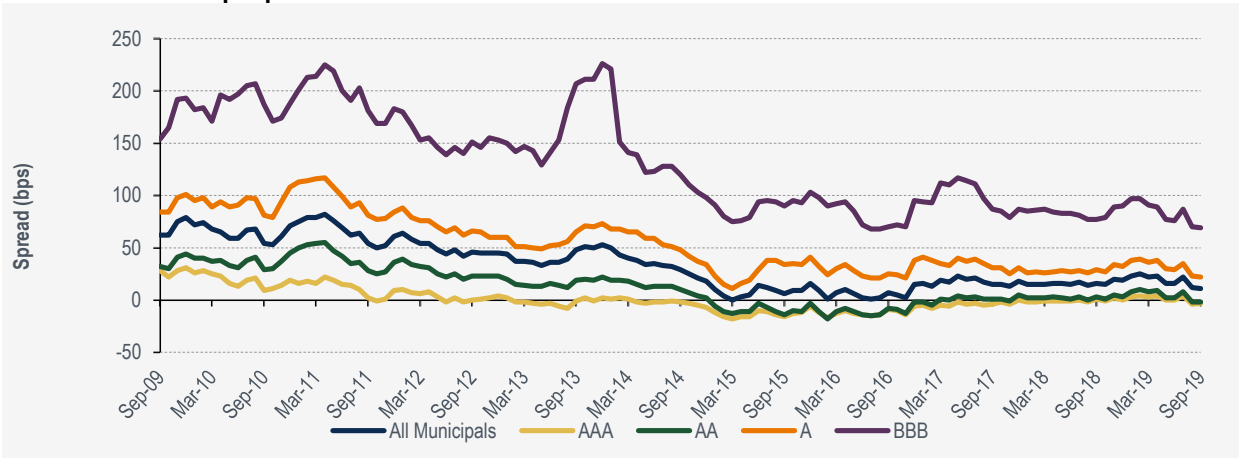
*The index closed the quarter with solid excess returns in September, but that was not nearly enough to offset shortfalls over the first two months of the quarter. Though this was a down quarter for the credit risk factor, BBBs held up best with a -0.30% excess return for the quarter followed by single-As (-0.46%), AAAs (-0.49%) and with AAs bringing up the rear (-0.56%).*

**Chart 16: Tax exempt excess returns vs. risk-matched AAA GOs**



*Regardless of the recent excess return performances, spreads remain well below the 10-year averages across all rating categories including the BBB Index, which at 69bp is only a little more than half its 130bp 10-year average.*

**Chart 17: Tax exempt spreads vs. AAA GOs**



## Sector

All sectors were in the black for the quarter with all but one, Refunded (0.44%), gaining at least 1% and IDRs topping the list with a 2.29% return for the quarter. With a 33bp curve rally driving the bond markets higher during Q3 it is not surprising that the lowest return belong Refund, the shortest sector in the index with a 2.45 year duration that is less than half that of next-shortest Pollution control (5.49 years). In fact, the five worst total return performances belonged to the five shortest sectors in the index. But sixth worst was Single Family Housing despite the fact that it has, by far, the longest duration in the index (11.19 years). Single Family Housing posted a dismal -2.48% excess return in Q3. That is 1.5% below next worse Multi Family Housing and ten times the 0.50% shortfall posted by the overall Index.

**Table 8: Tax-exempt excess returns vs. risk-matched AAA GOs**

	% wgt	Effective Duration	Contr EffDur	Total Return		Excess Return	
				3-Month	YTD	3-Month	YTD
By Rating Category:							
AAA	12.32	6.67	0.82	1.48	6.47	-0.49	-0.55
AA	52.31	6.78	3.54	1.50	6.58	-0.56	-0.68
A	25.18	7.12	1.79	1.83	7.72	-0.46	-0.03
BBB	10.20	7.07	0.72	1.90	8.66	-0.30	1.07
By Sector							
GO - State	15.44	5.55	0.86	1.10	5.93	-0.37	-0.12
GO - Local	10.34	7.28	0.75	1.79	7.23	-0.43	-0.38
<b>Total GO</b>	<b>25.77</b>	<b>6.24</b>	<b>1.61</b>	<b>1.37</b>	<b>6.44</b>	<b>-0.39</b>	<b>-0.23</b>
<b>Refunded</b>	<b>3.65</b>	<b>2.45</b>	<b>0.09</b>	<b>0.44</b>	<b>2.89</b>	<b>-0.04</b>	<b>0.04</b>
Airport	5.28	7.47	0.39	1.60	7.37	-0.79	-0.66
Education	5.36	8.26	0.44	1.99	7.94	-0.71	-0.73
Health	6.30	8.09	0.51	1.99	7.81	-0.68	-0.82
Hospitals	3.69	9.00	0.33	2.09	8.64	-0.89	-0.73
Housing - MF	0.71	8.07	0.06	1.81	6.60	-0.99	-1.72
Housing - SF	1.09	11.19	0.12	1.58	7.00	-2.48	-5.13
Industrial Develop	2.18	7.25	0.16	2.29	9.58	-0.06	1.84
Leasing/Rental	5.01	6.03	0.30	1.43	6.39	-0.28	-0.13
Pollution Control	0.44	5.49	0.02	1.32	5.31	-0.12	0.06
Power	2.87	6.03	0.17	1.41	6.05	-0.37	-0.53
Tax Revenues	12.61	6.97	0.88	1.67	7.33	-0.47	-0.23
Tobacco	1.14	7.34	0.08	2.21	9.12	-0.21	0.85
Toll & Turnpike	6.00	7.84	0.47	2.06	8.32	-0.51	-0.27
Transportation	7.29	6.67	0.49	1.70	7.70	-0.36	0.38
Utilities - Other	5.29	7.18	0.38	1.69	7.32	-0.59	-0.43
Water & Sewer	4.69	6.91	0.32	1.63	6.88	-0.58	-0.85
Miscellaneous	0.62	6.88	0.04	1.68	7.03	-0.52	-0.49
<b>Total Revenue</b>	<b>70.57</b>	<b>7.34</b>	<b>5.18</b>	<b>1.77</b>	<b>7.52</b>	<b>-0.56</b>	<b>-0.38</b>
By Effective Duration							
0-1 Year	2.51	0.58	0.01	0.68	2.25	0.37	0.92
1-2 Year	7.78	1.53	0.12	0.38	2.08	0.04	0.15
2-3 Year	7.50	2.53	0.19	0.47	2.80	0.02	0.10
3-4 Year	7.58	3.50	0.26	0.57	3.67	-0.06	0.06
4-5 Year	8.37	4.48	0.38	0.81	4.77	-0.10	0.07
5-6 Year	9.11	5.49	0.50	1.09	5.68	-0.18	-0.19
6-7 Year	9.51	6.50	0.62	1.45	6.81	-0.27	-0.32
7-8 Year	9.26	7.50	0.69	1.79	7.95	-0.45	-0.49
8-9 Year	8.51	8.49	0.72	2.18	8.61	-0.57	-0.89
9-10 Year	9.00	9.51	0.86	2.43	9.33	-0.83	-1.07
10-11 Year	8.15	10.47	0.85	2.58	10.06	-1.17	-1.23
11-12 Year	6.31	11.45	0.72	2.90	11.07	-1.28	-1.06
12+ Year	6.41	14.81	0.95	3.62	14.85	-1.76	0.46
<b>Broad Index</b>	<b>100.00</b>	<b>6.88</b>	<b>6.88</b>	<b>1.62</b>	<b>7.06</b>	<b>-0.50</b>	<b>-0.33</b>

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## State GO

After crushing the rest of the field with a 2.02% Q2 excess return (vs. 0.12% for the rest of the index), Illinois had a turbulent third quarter. The quarter started on a sour note as Illinois posted a -1.74% excess return in July as litigation was filed claiming that \$14bn in outstanding Illinois general obligation debt was issued in violation of the state constitution. The state partially bounced back in August (+0.84%) as an Illinois judge ruled that a challenge to the constitutionality of \$14bn in Illinois general obligation debt was political in nature and could not proceed in court, though the investment firm that filed the claim has indicated that it will appeal the ruling. Then, in September a Moody's report pegged the state's net pension liability at nearly a quarter trillion dollars – more than any other state – and Illinois was flat on the month while most other states posted modestly positive excess returns. The only state to post a lower excess return for the quarter, West Virginia (-1.84%), is nearly twice as long as the rest of the index and therefore was more challenged by the strength of the curve rally. Only one state managed to beat risk-matched AAA GOs by more than 5bp for the quarter: New Jersey (+0.21%). With no news of the type that dragged Illinois down, the second lowest rated state in the index was able to take advantage of the extra income generated by its higher yield to outperform the rest of the field.

**Table 9: Tax-exempt state GOs excluding insured and refunded bonds**

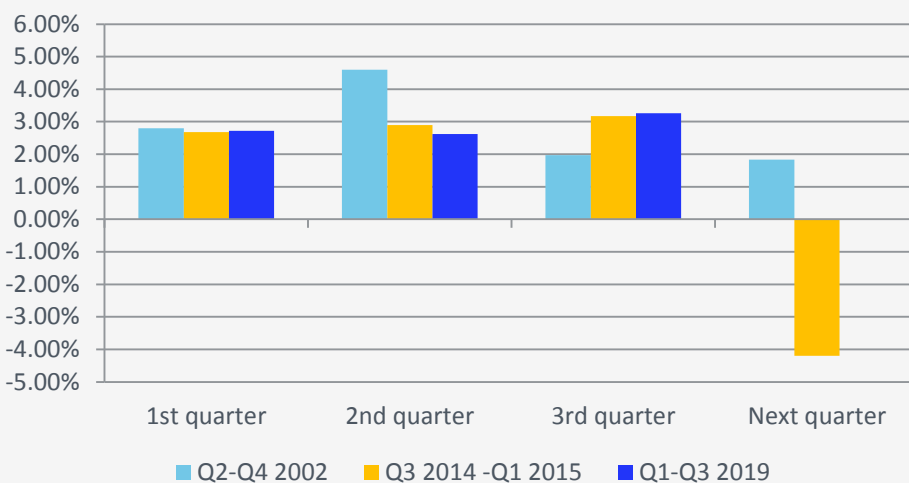
By State:	% wgt	Effective Duration	Contr EffDur	Total Return		Excess Return	
				3-Month	YTD	3-Month	YTD
New Jersey	0.43%	5.03	0.02	1.30	5.56	0.21	0.43
Virginia	0.21%	3.44	0.01	0.67	3.48	0.04	0.04
Arkansas	0.30%	1.88	0.01	0.42	2.66	0.04	0.09
Nevada	0.33%	3.90	0.01	0.72	4.39	0.03	0.26
Tennessee	0.20%	3.06	0.01	0.45	3.11	0.03	-0.09
Delaware	0.30%	4.01	0.01	0.92	4.50	0.02	-0.05
Rhode Island	0.09%	3.16	0.00	0.48	3.64	0.01	0.26
South Carolina	0.04%	0.99	0.00	0.37	1.89	0.01	-0.27
North Carolina	1.41%	5.03	0.07	0.74	3.78	0.00	-0.11
New Hampshire	0.01%	1.00	0.00	0.33	1.89	-0.01	-0.04
Connecticut	4.12%	4.91	0.20	1.27	6.97	-0.02	1.63
Alabama	0.08%	3.55	0.00	0.50	3.31	-0.02	-0.19
Louisiana	0.85%	4.11	0.03	0.89	4.56	-0.02	-0.10
Georgia	4.21%	5.59	0.24	1.48	5.96	-0.06	-0.24
Wisconsin	2.77%	4.76	0.13	0.68	3.69	-0.06	-0.26
New Mexico	0.19%	3.38	0.01	0.65	4.20	-0.06	0.05
Michigan	0.15%	4.26	0.01	0.88	5.18	-0.07	0.13
Maryland	5.69%	5.05	0.29	0.95	4.84	-0.08	-0.38
Utah	0.32%	3.99	0.01	0.62	4.08	-0.08	-0.10
Maine	0.04%	3.00	0.00	0.43	3.16	-0.10	0.00
Ohio	1.09%	4.29	0.05	0.74	4.59	-0.10	-0.04
Minnesota	1.40%	4.00	0.06	0.55	3.96	-0.10	-0.11
Florida	1.28%	3.43	0.04	0.63	3.49	-0.16	-0.11
Washington	5.96%	5.45	0.32	1.26	5.63	-0.19	-0.48
Hawaii	3.00%	5.53	0.17	1.25	6.05	-0.22	-0.34
New York	0.33%	3.54	0.01	0.77	4.17	-0.28	-0.19
Texas	5.05%	5.96	0.30	1.33	6.14	-0.32	-0.52
Pennsylvania	6.86%	5.54	0.38	1.12	6.51	-0.35	0.22
California	33.70%	5.81	1.96	1.12	5.67	-0.42	-0.53
Mississippi	0.58%	6.78	0.04	1.54	7.78	-0.50	-0.15
Massachusetts	10.73%	6.97	0.75	1.48	7.01	-0.63	-0.59
Oregon	0.21%	7.63	0.02	2.08	7.08	-0.64	-1.09
Illinois	7.98%	4.82	0.38	0.39	7.70	-0.86	2.02
West Virginia	0.09%	10.25	0.01	1.96	10.63	-1.84	-0.59
<b>GO - State (Total)</b>	<b>100.00%</b>	<b>5.55</b>	<b>5.55</b>	<b>1.10</b>	<b>5.94</b>	<b>-0.37</b>	<b>-0.11</b>

## Europe High Grade

*The Pan-Europe Broad Market Index matched its best quarter in seven years.*

The strong bond market rally that drove the Pan-Europe Broad Market Index to consecutive quarterly returns of more than 2.5% each in H1 gained even more momentum in Q3 as the Index returned 3.26%, matching the index's highest quarter of the last seven years. That adds up to an impressive 8.84% return for the three quarters combined and is the third best such string of quarterly performances that the index has seen since the adoption of the Euro at the end of 1998. The only better three quarter performances during that period were Q2 to Q4 2002 (9.63%) and Q3 2014 to Q1 2015 (9.00%). The Index followed the Q2 to Q4 2002 rally with a solid, if unspectacular, 1.83% return in the next quarter. However, following the Q3 2014 to Q1 2015 rally – a run that very closely matches the last three quarters – the index suffered a record loss in the next quarter.

**Exhibit A: Pan-Europe Broad Market Index best Euro era three quarter rallies**



*The performance gap between the Euro and Sterling Broad Indices was the widest it has been since mid-2016.*

Over the first two quarters of the year the Euro and Sterling components of the Pan-Europe Index flip-flopped with Sterling coming out on top by 1.25% in Q1 and a near complete reversal in Q2 with Euro leading by 1.24%. Those performance differences are not insignificant, but they are right in line with the average quarterly total return gap between the Euro and Sterling Broad Market Indices over the last 20 years (1.35%). The gap then widened significantly in Q3 as the Sterling Index outperformed its Euro counterpart by 2.86% – the widest difference between the two since Q2 2016 when Sterling outperformed by 3.93%.



*The primary source of the Euro-Sterling return differential was their respective curve performances...*

The primary source of the Euro-Sterling return differential was their respective curve performances. The Gilt curve rallied significantly more than Bunds (44bp vs 29bp) and on top of that the Sterling market has significantly more duration exposure (13.61 years vs. 8.36 years for the broad Euro Index). That accounted for a 3.61% curve factor differential. Offsetting that was a 1% differential in credit spread performance that favored the Euro broad index.

*...and even the bulk of the performance differential attributed to “credit” came from the sovereign sector.*

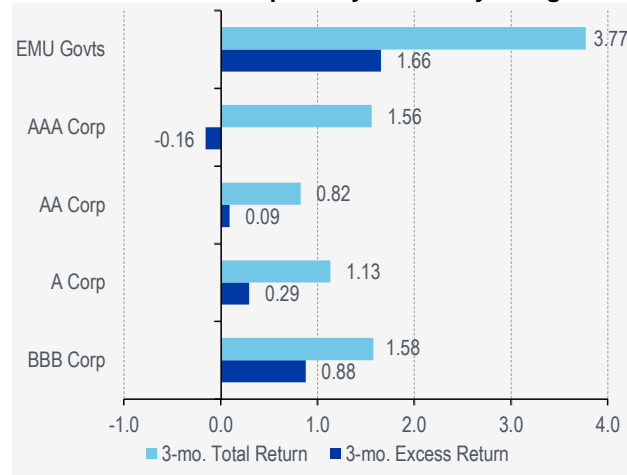
Surprisingly the bulk of the “credit” spread differential actually comes from the sovereign sector and not corporates. In fact, with a 6.72% excess return versus risk-matched Bunds, and a 13.3% share of the Euro Broad Market Index, Italy sovereigns alone accounted for about three-quarters of the Euro Broad Market Index 1.18% excess return in Q3. Italy sovereigns surged to their best excess return versus risk-matched Bunds in over seven years as its La Lega party failed in its attempt to bring down the government and call an early election.

The recent Euro sovereign excess return performance is not a rare anomaly. A comparison of Euro sovereign and corporate annualized excess returns by rating over the last five years shows that single-A and BBB Euro sovereigns have outperformed risk-matched Bunds by a wider margin than their corporate counterparts. However, when those results are risk-adjusted it is the corporate sector that has the best Information ratios for that period across all rating categories.

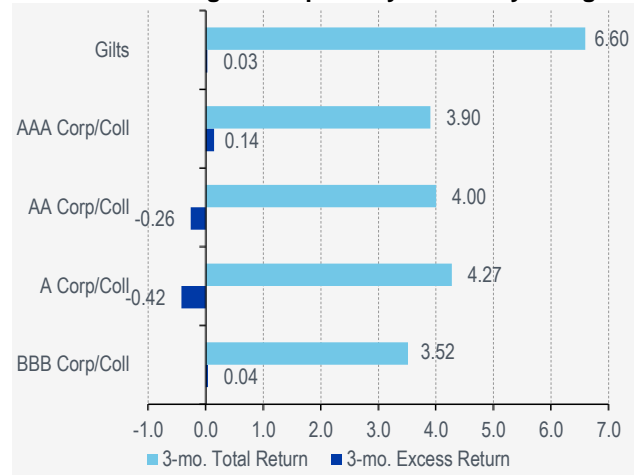
**Exhibit B: Euro sovereign vs. Corporate excess returns by rating**

	AAA	AA	A	BBB
<b>Annualized excess return Last 5 years):</b>				
Sovereign (ex-Germany)	0.12	0.38	1.24	2.02
Corporate	0.41	0.69	1.07	1.69
Corporate - Sovereign	0.28	0.31	(0.17)	(0.33)
<b>Information ratio (last 5 years):</b>				
Sovereign (ex-Germany)	0.47	0.43	1.07	0.65
Corporate	0.52	1.13	1.19	1.14
Corporate - Sovereign	0.05	0.70	0.12	0.49

**Exhibit C: Euro Index quarterly returns by rating**



**Exhibit D: Sterling Index quarterly returns by rating**



*The 12-month upgrade/downgrade ratio fell to its lowest level since April 2017.*

After two quarters near the parity mark, the combined Euro and Sterling investment grade corporate index upgrade/downgrade ratio slipped to 0.74. The good news was that the downward trend came on relatively light total volume of rating changes (\$83bn in Q3 vs. \$131bn quarterly average since 1999). In fact, the volume of downgrades declined significantly versus the prior quarter (\$48bn in Q3 vs. \$74bn in Q2) but the same was true on the upgrade side as well (\$35bn in Q3 vs. \$70bn in Q2). Of greater note is the fact that the 12-month upgrade/downgrade ratio fell progressively throughout the quarter, finishing at 0.85 – its lowest reading since April 2017. The last time that ratio had dropped below the 1.0 mark after an extended period above that line was April 2008, just prior to the financial crisis.

## Europe Corporates

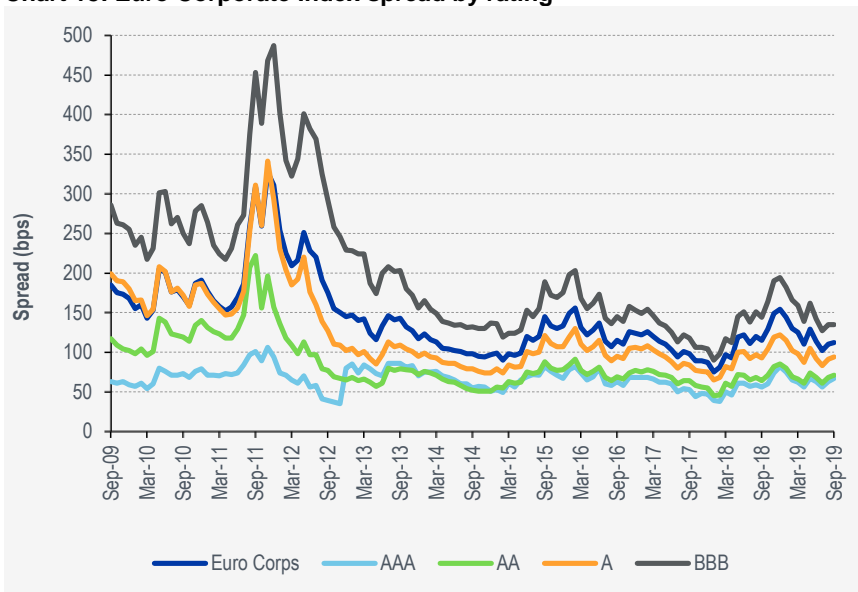
*Q3 saw the Euro Corporate Index spread tighten a modest 2bp, but sector spreads were mixed. Healthcare actually widened 5bp and is the sector with the highest spread relative to its 10 year average.*

**Table 10: Euro Corporate Index (ER00) spread & excess return by sector**

Sector	%wgt	Eff.Dur.	Option-Adjusted Spread (OAS)						Excess return %							
			Current	QoQ	YoY	Current spread multiple vs			Annualized					Information ratio		
						10yr high	10yr low	10yr avg	3mo	1yr	3yrs	5yrs	10yrs	3yrs	5yrs	10yrs
Euro Corp Index	100.0	5.25	112	-2	-3	0.3	1.5	0.8	0.56	2.18	1.72	1.40	1.89	0.20	0.17	0.19
Automotive	6.8	4.65	129	-4	9	0.5	1.9	1.1	0.70	2.09	1.74	1.18	1.68	0.14	0.10	0.18
Banking	29.0	4.21	102	-4	-9	0.2	1.4	0.7	0.60	2.21	1.84	1.46	1.96	0.26	0.22	0.18
Basic Industry	5.1	5.01	104	0	0	0.4	1.5	0.8	0.39	1.82	1.46	0.90	1.56	0.21	0.09	0.16
Capital Goods	3.4	5.95	112	5	12	0.5	1.6	0.9	0.21	0.51	0.68	0.81	1.52	0.05	0.09	0.18
Consumer Goods	6.1	6.05	102	3	9	0.5	1.6	1.0	0.30	1.39	0.88	0.97	1.52	0.09	0.11	0.21
Energy	5.3	5.25	122	-9	-4	0.5	1.5	0.9	0.74	1.82	2.05	1.17	1.70	0.20	0.10	0.17
Financial Services	1.8	5.37	120	-8	-10	0.4	1.6	0.8	0.71	2.19	1.96	1.68	2.34	0.28	0.25	0.28
Healthcare	5.0	7.04	101	5	18	0.7	1.8	1.2	0.24	1.41	1.33	1.09	1.17	0.12	0.12	0.17
Insurance	4.6	5.55	179	-10	-21	0.4	1.5	0.8	1.41	4.77	4.47	3.18	3.84	0.26	0.17	0.19
Leisure	0.2	3.68	123	0	23	0.3	1.6	0.7	0.55	1.34	1.50	1.69	2.99	0.33	0.29	0.25
Media	1.2	5.06	107	0	-5	0.4	1.4	0.8	0.62	2.45	1.79	1.61	2.42	0.26	0.19	0.31
Real Estate	4.6	5.75	131	-2	-12	0.4	1.4	0.9	0.60	3.12	1.75	1.87	2.35	0.17	0.19	0.26
Retail	1.5	5.54	111	-3	12	0.5	1.7	1.0	0.45	0.79	0.90	0.64	1.34	0.10	0.05	0.15
Services	1.4	4.96	101	-4	-10	0.3	1.3	0.7	0.61	2.03	1.41	1.38	2.25	0.24	0.23	0.35
Technology & Electronics	2.7	5.52	87	1	9	0.3	1.6	0.8	0.40	1.54	1.37	1.13	1.26	0.19	0.14	0.15
Telecommunications	7.1	6.22	112	1	-1	0.4	1.4	0.8	0.37	2.49	1.50	1.45	1.78	0.15	0.16	0.17
Transportation	4.5	5.96	111	2	-1	0.3	1.7	0.9	0.32	1.90	0.96	1.04	1.71	0.10	0.15	0.18
Utility	9.5	5.75	107	-1	-5	0.4	1.4	0.8	0.58	2.63	1.70	1.51	1.81	0.18	0.17	0.19

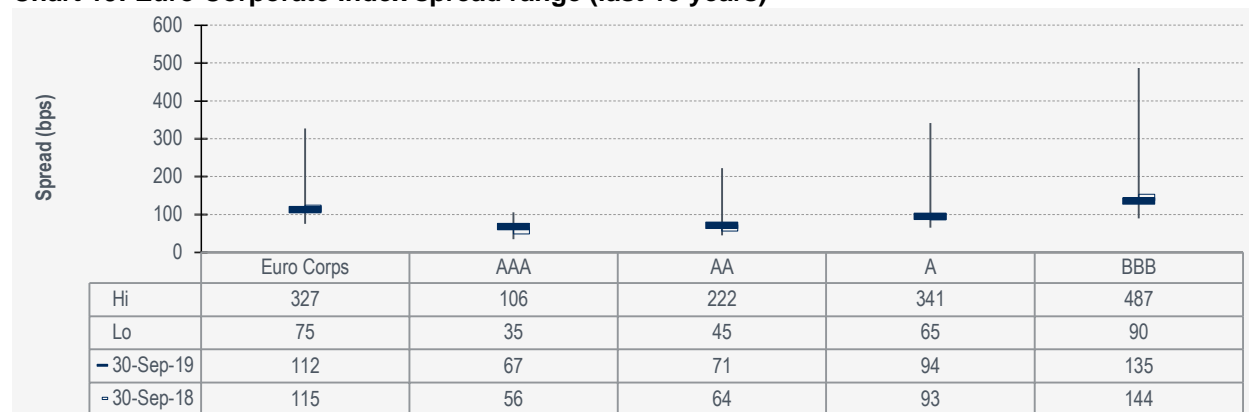
*Only the BBB segment tightened during Q3 (-7bp).*

**Chart 18: Euro Corporate Index spread by rating**



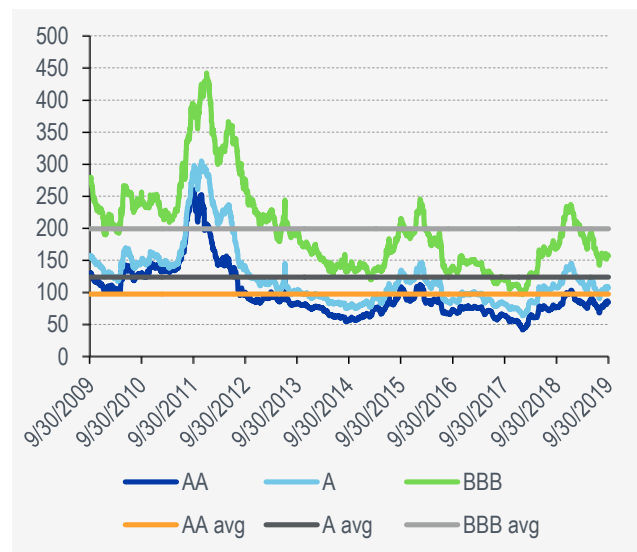
*In addition to being the only rating segment to tighten in Q3, BBBs are also the only rating group that are tighter YoY.*

**Chart 19: Euro Corporate Index spread range (last 10 years)**



*The BBB-A 10 year spread multiple is now notably below its long-term average.*

**Chart 20: 10-year maturity EUR corporate spreads**



**Chart 21: 10-year maturity EUR corporate spread multiples**



*Neither the 5- or 10-year Sharpe ratios were much changed QoQ. The best Sharpe ratio over the last five years, 1-3 Year Corporates, fell slightly but retains a sizable lead over the next-best 3-5 Year Corporate segment.*

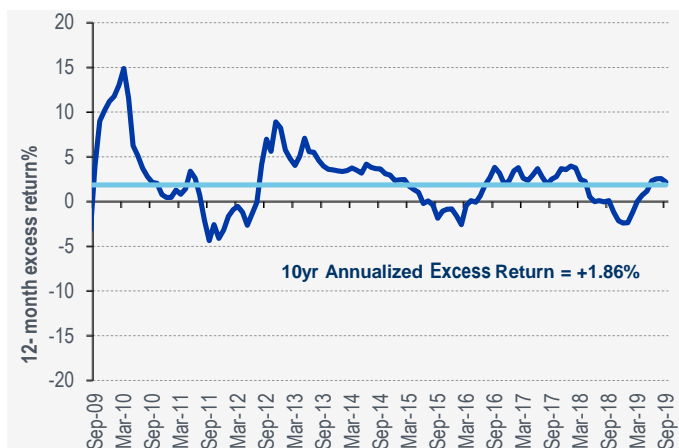
**Table 11: Euro Five- and Ten-Year Sharpe Ratios (as of 30 Sep 2019)**

Index	Ticker	Ann. Total Return		Ann. Std. Dev.		Sharpe Ratio		Chg vs Prior Qtr	
		5Yrs	10Yrs	5Yrs	10Yrs	5Yrs	10Yrs	5Yrs	10Yrs
3-Month Euro Deposit	LEC3	-0.20%	0.26%	0.05	0.17				
Euro Broad Market	EMU0	2.55%	4.04%	3.16	3.37	0.31	0.35	0.01	0.00
Euro Sovereigns	EG00	2.79%	4.13%	4.04	4.23	0.27	0.29	0.01	0.00
1-3 Yr	EG01	0.19%	1.20%	0.57	1.29	<b>0.23</b>	<b>0.22</b>	0.00	-0.01
3-5 Yr	EG02	1.03%	2.55%	1.51	2.40	0.27	0.29	0.00	0.00
5-7 Yr	EG03	2.01%	3.90%	2.58	3.56	0.29	0.31	-0.01	0.00
7-10 Yr	EG04	3.55%	5.08%	4.08	4.89	0.31	0.30	0.00	0.00
10+ Yr	EG09	5.74%	7.18%	9.19	8.73	0.24	0.26	0.01	0.01
Austria	G0H0	2.79%	4.53%	4.02	4.63	0.26	0.29	0.00	0.00
Belgium	G0G0	3.26%	4.86%	4.95	5.47	0.25	0.26	0.00	0.01
Finland	G0K0	2.17%	3.71%	3.31	3.73	0.25	0.28	0.00	0.00
France	G0F0	2.94%	4.31%	4.30	4.58	0.25	0.28	0.00	0.00
Germany	G0D0	2.46%	3.75%	3.83	4.22	<b>0.24</b>	0.25	0.00	0.00
Ireland	G0R0	2.82%	5.95%	3.52	9.54	0.30	<b>0.19</b>	0.00	-0.01
Italy	G0I0	2.17%	4.35%	6.11	6.94	<b>0.15</b>	<b>0.19</b>	0.00	0.00
Luxembourg	G0L0	1.58%	3.34%	1.95	3.05	0.30	0.30	-0.02	-0.01
Netherlands	G0N0	2.68%	4.09%	4.01	4.44	0.24	0.27	0.00	0.00
Slovakia	G0S0	2.97%	5.10%	3.49	4.10	0.32	0.36	0.00	-0.01
Slovenia	G0SV	4.58%	5.46%	4.39	7.12	0.38	0.24	0.02	0.00
Spain	G0E0	3.68%	5.05%	4.22	6.34	0.34	0.25	0.02	0.01
Quasi-Governments	EQ00	2.01%	3.57%	2.37	2.70	0.33	0.38	0.01	0.00
1-3 Yr	EQ01	0.15%	1.41%	0.31	0.85	0.38	0.40	0.01	-0.01
3-5 Yr	EQ02	0.93%	2.68%	1.00	1.85	0.38	0.39	0.00	-0.01
5-7 Yr	EQ03	1.91%	4.05%	2.02	2.90	0.35	0.39	0.00	-0.01
7-10 Yr	EQ04	3.37%	5.39%	3.46	4.31	0.35	0.36	0.00	-0.01
10+ Yr	EQ09	5.60%	7.45%	7.69	7.97	0.27	0.29	0.01	0.00
Securitized/Collateralized	EL00	1.58%	3.45%	1.62	2.34	0.37	0.41	-0.01	-0.02
Corporates	ER00	2.65%	4.34%	2.53	3.00	0.38	0.41	0.00	-0.01
All Financials	EB00	2.60%	4.30%	2.15	3.21	<b>0.43</b>	0.38	0.00	-0.02
All Industrials	EJ00	2.61%	4.29%	2.85	2.91	0.33	<b>0.42</b>	0.01	-0.01
All Utilities	EK00	2.94%	4.73%	2.88	3.34	0.36	0.40	0.00	-0.01
1-3 Yr	ER01	0.89%	2.17%	0.59	1.19	<b>0.58</b>	<b>0.47</b>	-0.02	-0.01
3-5 Yr	ER02	1.97%	3.87%	1.52	2.42	<b>0.47</b>	<b>0.44</b>	0.00	-0.01
5-7 Yr	ER03	3.08%	5.29%	2.77	3.79	0.40	0.40	0.00	-0.01
7-10 Yr	ER04	4.20%	6.33%	4.21	5.28	0.35	0.35	0.01	-0.01
10+ Yr	ER09	5.42%	7.77%	6.69	6.96	0.29	0.33	0.01	-0.01
AAA	ER10	3.36%	4.50%	3.98	3.44	0.29	0.37	-0.01	0.00
AA	ER20	2.19%	3.62%	2.30	2.62	0.33	0.38	-0.01	-0.02
A	ER30	2.48%	4.04%	2.32	2.93	0.38	0.39	0.00	-0.01
BBB	ER40	2.88%	4.96%	2.91	3.82	0.36	0.37	0.01	-0.02

Note: Reverse highlighted values represent the top three performing sectors in each respective period; shaded values are the bottom three performing sectors.

*The current 12-month excess return is close to the 10-year annualized result, and both are very respectable given the 142bp average index spread over the last 10 years.*

**Chart 22: Euro Corporate Index 12-month excess return**



**Table 12: Euro corporate Index 12-month excess return**

10yr Ann. Excess Return	1.86
Current	2.18
Hi (Mar-10)	14.87
Lo (Sep-11)	-4.38
Std. Dev	3.43

## Sterling Corporates

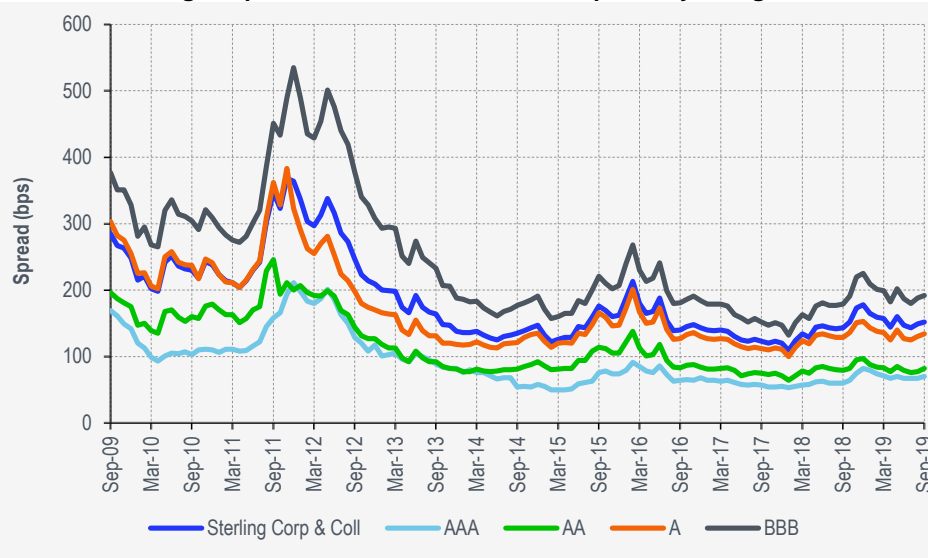
*General Electric helped push Capital Goods to the bottom of the rankings in Q3 (+20bp), but that sector is also the only one with a negative annualized excess return over the last five years.*

**Table 13: Sterling Corporate Index (UR00) spread & excess return by sector**

Sector	%wgt	Eff.Dur.	Option-Adjusted Spread (OAS)						Excess return %							
			Current	QoQ	YoY	Current spread multiple vs			Annualized					Information ratio		
						10yr high	10yr low	10yr avg	3mo	1yr	3yrs	5yrs	10yrs	3yrs	5yrs	10yrs
Sterling Corp Index	100.0	8.73	153	4	6	0.4	1.4	0.8	-0.09	1.57	1.42	1.37	2.33	0.15	0.09	0.16
Automotive	3.3	3.19	118	-1	22	0.6	2.0	1.1	0.42	1.53	1.11	0.99	1.60	0.27	0.16	0.30
Banking	21.9	5.91	151	4	4	0.3	1.5	0.7	0.10	2.11	2.31	1.75	2.80	0.24	0.12	0.15
Basic Industry	2.1	7.71	123	4	7	0.3	1.3	0.7	-0.11	1.77	2.25	2.01	2.91	0.28	0.11	0.18
Capital Goods	1.9	8.53	199	20	68	0.7	2.5	1.3	-1.03	-5.30	-2.38	-0.64	1.13	-0.09	-0.02	0.08
Consumer Goods	4.6	6.86	128	0	13	0.6	1.5	1.0	0.22	-0.23	-0.22	0.65	1.69	-0.04	0.06	0.17
Energy	2.8	6.99	126	1	0	0.6	1.4	0.9	-0.02	1.44	1.25	0.54	1.49	0.21	0.05	0.14
Financial Services	2.8	9.84	168	-1	-8	0.6	1.6	0.9	-0.27	1.42	2.16	2.35	3.35	0.24	0.20	0.26
Healthcare	2.9	12.21	119	8	13	0.7	1.5	1.2	-0.87	-0.61	-0.35	0.76	1.16	-0.03	0.05	0.08
Insurance	8.7	6.38	219	10	5	0.4	1.5	0.8	0.10	3.58	4.35	2.80	4.91	0.29	0.13	0.20
Leisure	0.4	4.81	157	-3	10	0.5	1.5	0.9	0.49	1.17	1.20	1.31	2.79	0.22	0.14	0.30
Media	1.1	8.81	185	9	6	0.7	1.6	1.1	-0.68	1.37	1.07	0.84	1.96	0.09	0.06	0.13
Real Estate	10.9	12.77	167	1	10	0.5	1.5	1.0	0.35	1.19	1.18	0.66	2.81	0.15	0.05	0.24
Retail	2.5	8.30	132	11	18	0.7	1.4	1.0	-0.31	0.71	1.13	1.13	1.34	0.16	0.06	0.11
Services	2.6	19.92	90	-1	6	0.4	1.4	0.7	0.33	2.31	-0.69	0.31	1.60	-0.08	0.03	0.17
Technology & Electronics	1.4	7.02	113	9	34	n.a.	n.a.	n.a.	0.06	0.68	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Telecommunications	7.5	10.25	168	2	4	0.6	1.3	1.0	-0.26	1.44	1.07	1.34	1.84	0.07	0.08	0.11
Transportation	3.9	9.62	131	-4	-5	0.4	1.6	0.9	0.29	1.42	0.36	0.61	1.45	0.08	0.07	0.14
Utility	18.7	9.83	146	5	-1	0.6	1.3	0.9	-0.60	1.97	0.99	1.40	1.72	0.08	0.08	0.11

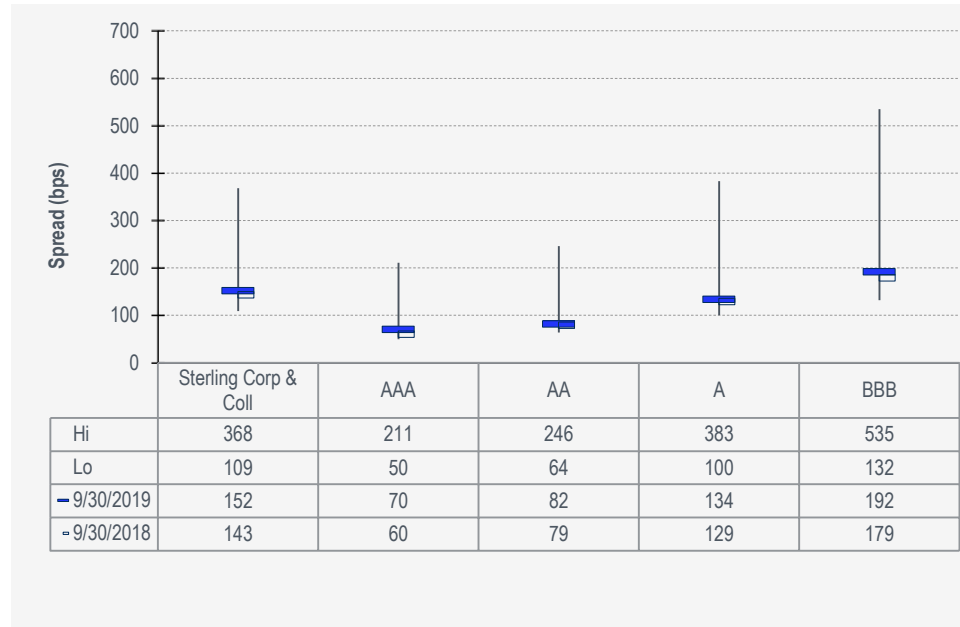
*Spreads widened across the board, but the single-A spread moved the most on a percentage basis.*

**Chart 23: Sterling Corporate & Collateralized Index spread by rating**



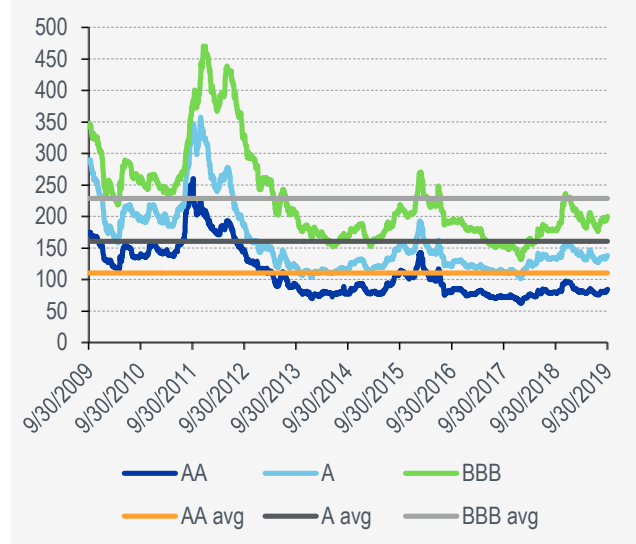
*Spreads are wider YoY as well as QoQ, though they remain below their 10-year averages.*

**Chart 24: Sterling Corporate & Collateralized Index spread range (last 10 years)**

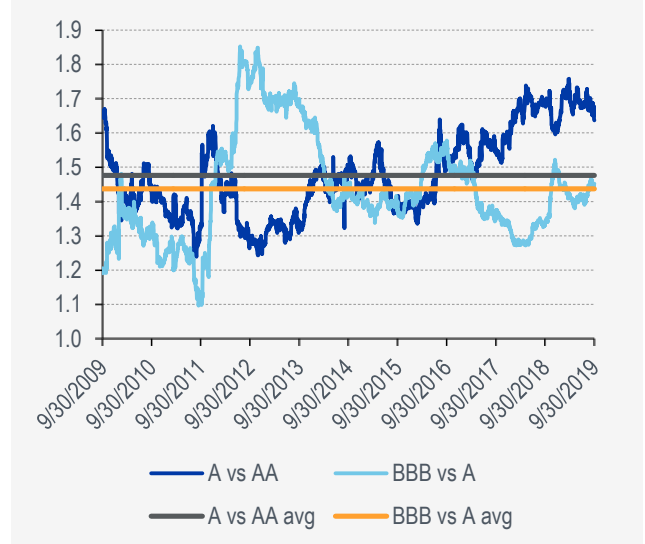


*The A-AA spread multiple remains well above its long-term average, while the BBB-A multiple is right in line with its average.*

**Chart 25: 10 Year GBP corporate spreads**



**Chart 26: 10 Year GBP corporate spread multiples**





*With little movement in Sharpe ratios QoQ, short Corporates remain well ahead of other segments. Over the longer 10 year horizon the short Quasi-Government sector is not far from breaking into the top tier.*

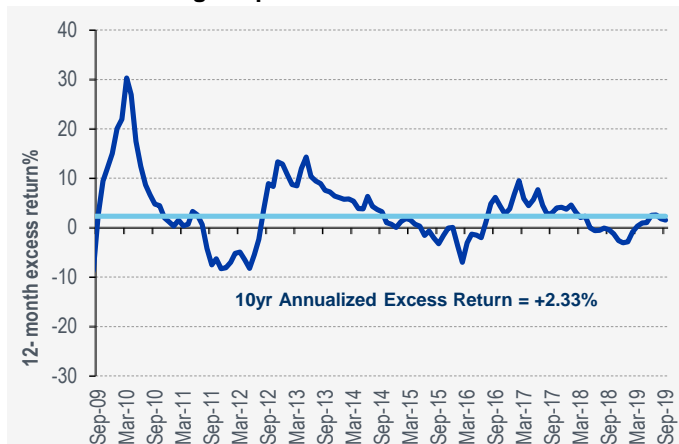
**Table 14: Sterling Five- and Ten-Year Sharpe Ratios (as of 30 Sep 2019)**

Index	Ticker	Ann. Total Return		Ann. Std. Dev.		Sharpe Ratio		Chg vs Prior Qtr	
		5Yrs	10Yrs	5Yrs	10Yrs	5Yrs	10Yrs	5Yrs	10Yrs
3-Month Sterling Deposit	LBP3	0.58%	0.64%	0.06	0.06				
Sterling Broad Market	UK00	6.11%	6.11%	6.53	5.80	0.25	0.27	0.02	0.00
Gilts	G0L0	6.34%	5.88%	7.28	6.48	0.23	0.24	0.02	0.01
1-3 Yr	G1L0	0.82%	1.14%	0.83	0.84	0.08	0.17	-0.01	-0.02
3-5 Yr	G2L0	2.19%	2.68%	2.17	2.23	0.21	0.26	0.00	-0.01
5-7 Yr	G3L0	3.28%	3.65%	3.45	3.54	0.23	0.25	0.01	0.01
7-10 Yr	G4L0	4.90%	5.25%	5.27	5.29	0.24	0.25	0.01	0.01
10+ Yr	G9L0	9.68%	8.56%	11.51	10.34	0.23	0.23	0.02	0.01
Non-Gilts	UN00	5.64%	6.55%	5.40	5.19	0.27	0.33	0.01	-0.02
Quasi-Government	UQ00	4.22%	4.54%	4.34	4.14	0.24	0.27	0.00	0.00
1-3 Yr	UQ01	1.27%	1.65%	0.76	0.77	0.26	0.38	-0.01	-0.01
3-5 Yr	UQ02	2.34%	2.91%	2.02	2.11	0.25	0.31	0.00	-0.02
5-7 Yr	UQ03	3.73%	4.46%	3.25	3.40	0.28	0.32	0.00	-0.01
7-10 Yr	UQ04	5.13%	5.85%	4.66	4.73	0.28	0.32	0.02	0.00
10+ Yr	UQ09	8.03%	7.64%	8.69	8.26	0.25	0.25	0.01	0.01
AAA	UQ10	3.79%	4.27%	3.98	3.98	0.23	0.26	0.00	0.00
AA	UQ20	5.06%	4.13%	5.28	4.66	0.25	0.22	0.01	0.00
Corporate & Collateralized	UC00	6.06%	7.17%	5.83	5.66	0.27	0.33	0.01	-0.02
All Financials	UF00	5.83%	7.28%	5.03	5.92	0.30	0.32	0.01	-0.03
All Industrials	UI00	6.01%	6.84%	6.32	5.80	0.25	0.31	0.01	-0.01
All Utilities	UU00	6.99%	7.38%	7.68	7.10	0.24	0.27	0.00	-0.01
1-3 Yr	UC01	2.39%	3.45%	0.94	1.42	0.55	0.56	0.00	0.00
3-5 Yr	UC02	3.70%	5.06%	2.15	3.02	0.41	0.42	0.01	-0.02
5-7 Yr	UC03	5.06%	6.66%	3.36	4.14	0.38	0.41	0.01	-0.02
7-10 Yr	UC04	5.91%	7.39%	4.87	5.60	0.31	0.34	0.01	-0.03
10+ Yr	UC09	7.96%	8.65%	8.84	8.09	0.24	0.29	0.01	-0.01
AAA	UC10	5.04%	6.21%	5.05	4.93	0.26	0.32	0.01	-0.01
AA	UC20	6.02%	6.64%	5.86	5.67	0.27	0.30	0.01	-0.01
A	UC30	6.36%	6.98%	6.68	6.33	0.25	0.29	0.01	-0.02
BBB	UC40	5.94%	7.89%	5.33	5.50	0.29	0.37	0.02	-0.02

Note: Reverse highlighted values represent the top three performing sectors in each respective period; shaded values are the bottom three performing sectors.

*The Sterling Corporate Index 10-year annualized excess return is higher than that of its Euro counterpart (2.33% vs. 1.83%), but also comes with almost double the volatility (6.60 vs.3.43 standard deviation).*

**Chart 27: Sterling Corporate Index 12-month excess return**



**Table 15: Sterling corporate Index 12-month excess return**

10yr Ann. Excess Return	2.33
Current	1.57
Hi (Mar-10)	30.33
Lo (Nov-11)	-8.30
Std. Dev	6.60

# High Yield

## Global High Yield Index (HW00)

*For the second straight quarter the Global High Yield Index total return fell to less than half of the previous period result.*

For the second straight quarter the Global High Yield Index total return fell to less than half of the previous period result. The index still managed to gain 1.14% on the quarter – an indication of just how good it started the year in Q1 – but that is below the 1.75% average quarterly return over the index's 22 year history, and ranks in the bottom 40% of quarterly performances. On the other hand, the Q3 return was enough to push the Index over the 10% mark for the year. That is a level that the index has achieved once every three years, on average, and the last time it reached that mark was three years ago. So assuming there is no setback in Q4 to take it back below 10% this year's performance appears to be right on schedule.

*More often than not, when the index posts gains in the first three quarters it makes it into the black for Q4 as well.*

In exploring the likelihood that the index could suffer a setback in Q4 it is worth looking at other year's in which the index had positive performances in the first three quarters. Over the last 21 years there were seven such occurrences, the most recent in 2017 (Exhibit A). In six of those occurrences the index went on to produce a positive return in Q4. Only once, in 2007, did it fail to do so. 2007 was different from the other six observations in one other aspect – at the end of Q3 its YTD return was just 2.93%. In other words, it may have been consistently in the black over the first three quarters but it had no particularly large quarterly returns and in a couple of quarters in which it barely made it into the black. The other six years had all 9 month returns of at least 7%. With a YTD return at the end of September of 10.87%, 2019 seems to be more like those years.

**Exhibit A: Global High Yield Index years with positive returns in first three quarters**

	2019	2017	2016	2012	2009	2007	2006	2003
Q1	6.75	2.81	3.16	6.94	5.32	2.55	2.90	7.19
Q2	2.69	1.99	5.13	1.14	24.08	0.32	0.29	10.14
Q3	1.14	2.16	5.15	5.44	16.06	0.05	3.97	2.76
Q4		0.49	1.62	4.15	5.91	(1.33)	4.09	5.68
1st 9 months	10.87	7.11	14.05	14.04	51.66	2.93	7.29	21.31
Full Year	10.87	7.64	15.90	18.77	60.62	1.56	11.68	28.20

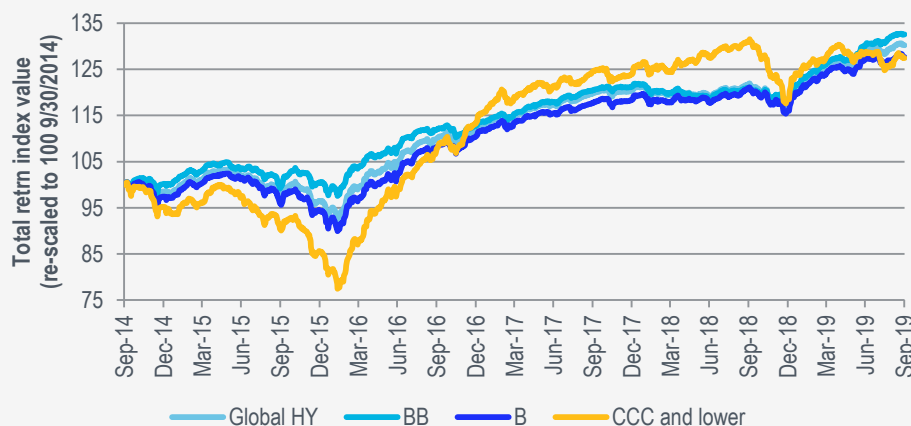
*As the high yield markets slowed in Q3, performance deteriorated the most in the lower rating categories.*

As the high yield markets slowed in Q3, performance deteriorated the most in the lower rating categories. Overall, the Global High Yield Index gained less than half as much as the Global High Grade Corporate Index in Q3 (1.14% vs. 2.54%). Adjusted for duration risk, that gap narrows significantly, but high yield still had the lower excess return of the two (0.10% vs. 0.31%). However, if you break the high yield performance down by rating category you find that the BB segment actually did much better than high grade in Q3 as it scored a 0.78% excess return. But the single-B segment was down about half a percent versus risk-matched benchmark governments and the CCC and lower shortfall was multiples of that (Exhibit B). Over the last five years, the CCC and lower segment has at various times been well below and well ahead of the rest of the field. Just a year ago it was riding high at the peak of its cycle. But the last quarter has been enough to drag it below its higher rated peers (Exhibit C).

**Exhibit B: Global High Yield Index Q3 2019 performance by rating**

	Q3 total return	Q3 excess return
Global High Grade Corporates	2.54	0.31
Global High Yield Index	1.14	0.10
BB	1.92	0.78
BB	0.47	(0.48)
CCC and lower	(0.82)	(1.76)

**Exhibit C: Global high yield total return performance by rating  
(index values rescaled to 100 on 9/30/2014)**



*Trade wars and Brexit seem to be having an impact on the index.*

Are recent global events, such as the trade wars and Brexit, affecting high yield market performance? A comparison of Q3 performance by country of risk appears to suggest that there has been an impact. Of all countries with a 1% or more representation in the index, the U.S., the U.K., and China had, by far, the worst

excess return performances in the index. With a -0.09% excess return, the U.S. was the best of that lot and it was well below the rest of the index (-0.09% vs. 0.77%). And China (-1.49%) and the U.K. (-1.87%) were in a league of their own. Of the other countries with at least a 1% share of the index, Canada had the lowest excess return and at 0.66% it was well ahead of the U.S. A further indication that this was a geographical and not an issuer specific anomaly is the fact that 29% of all issuers in those three countries had negative excess returns, while only 12% of issuers in other countries landed in the red.

**Exhibit C: Excess return performance by country of risk**

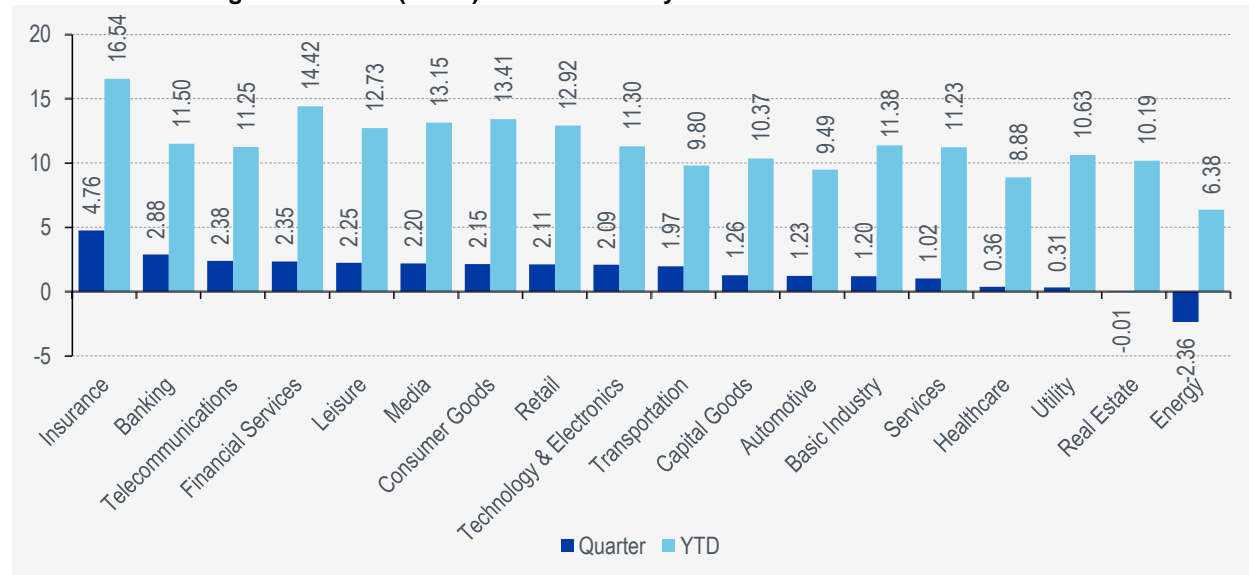
Country of Risk	# Issuers	# with negative excess returns	% negative	Total Return 3-month	Total Return YTD	Excess Return 3-month	Excess Return YTD
U.K.	71	24	34%	(0.74)	6.38	(1.87)	2.76
China	83	38	46%	(0.70)	9.56	(1.49)	5.94
U.S.	737	199	27%	1.06	11.08	(0.09)	6.08
US/UK/CN combined	891	261	29%	0.81	10.66	(0.31)	5.85
Other	687	83	12%	1.71	11.25	0.77	7.29
Total	1,578	344	22%	1.14	10.87	0.10	6.38

*The quarterly upgrade/downgrade ratio fell to its lowest level in 3½ years.*

The Global High Yield Index quarterly upgrade/downgrade ratio fell to its lowest level in 3½ years as more than twice as much constituent debt was downgraded as was upgraded. In Q3 the volume of downgrades jumped to \$121bn from \$80bn in the prior quarter. Meanwhile the volume of upgrades sank to just \$53bn from \$73bn in the prior quarter. The combined volume of rating changes (\$174bn) is the highest the index has seen since Q1 2018 and exceeds the quarterly average going back to 1999 (\$148bn).

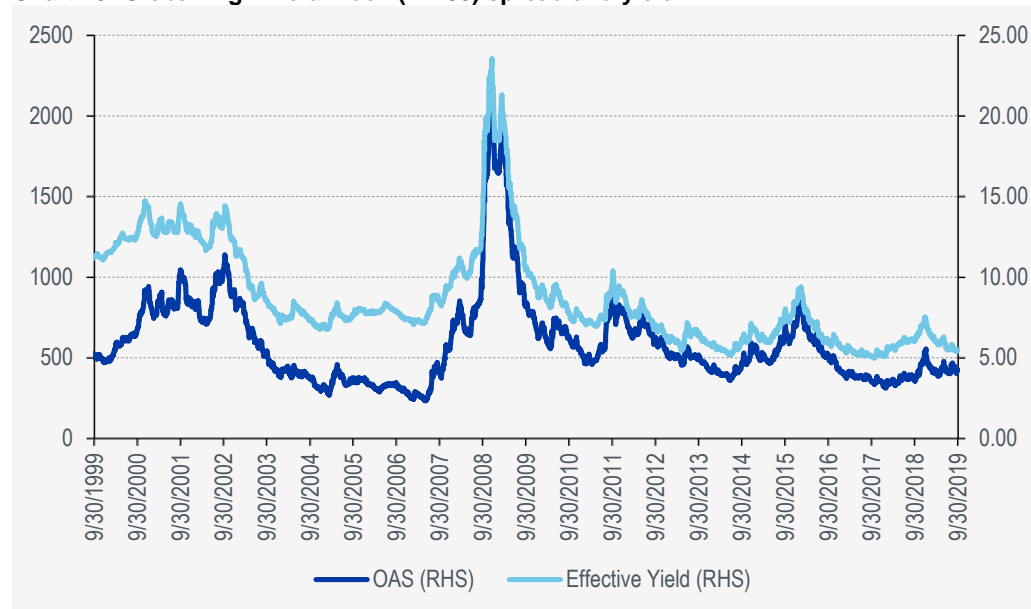
*The best and worst sectors in Q3 are also the top and bottom ranked performers YTD (Insurance and Energy, respectively).*

**Chart 28: Global High Yield Index (HW00) total return % by sector**



*The index spread widened modestly in Q3 (+7bp), but the yield fell modestly to 5.48%, leaving it exactly 50bp over the all-time low set two years ago.*

**Chart 29: Global High Yield Index (HW00) spread and yield**



*Sector results were mixed in Q3, with Real Estate widening by 83bp at one extreme and Transportation tightening by 50bp at the other. Media was one of the better performers and is near its 10-year low.*

**Table 16: Global High Yield Index sector spreads**

Sector	Current	QoQ chng	YoY chng	Current spread multiple vs		
				10yr high	10yr low	10yr avg
Automotive	394	18	97	0.6	2.0	1.0
Banking	325	-12	-34	0.3	1.5	0.7
Basic Industry	408	19	69	0.4	1.6	0.8
Capital Goods	328	3	33	0.4	1.2	0.7
Consumer Goods	405	-15	15	0.5	1.3	0.8
Energy	618	57	229	0.4	1.7	1.0
Financial Services	375	-24	15	0.3	1.3	0.7
Healthcare	446	21	132	0.6	1.4	1.0
Insurance	423	-41	43	0.4	1.3	0.8
Leisure	278	-29	-16	0.3	1.2	0.5
Media	270	-25	-54	0.3	1.0	0.5
Real Estate	641	83	49	0.5	1.8	0.9
Retail	510	-25	-1	0.6	1.2	0.9
Services	386	-28	23	0.4	1.2	0.7
Technology & Electronics	324	30	57	0.3	1.4	0.6
Telecommunications	426	-29	35	0.5	1.2	0.8
Transportation	528	-50	24	0.6	1.4	0.8
Utility	367	29	18	0.4	1.4	0.7
Global High Yield Index	425	7	61	0.5	1.3	0.8

*The 5-year Sharpe ratios were on the rise in general QoQ, but European Issuers indices extended their lead.*

**Table 17: Five- and Ten-Year Sharpe Ratios (as of 30 Sep 2019)**

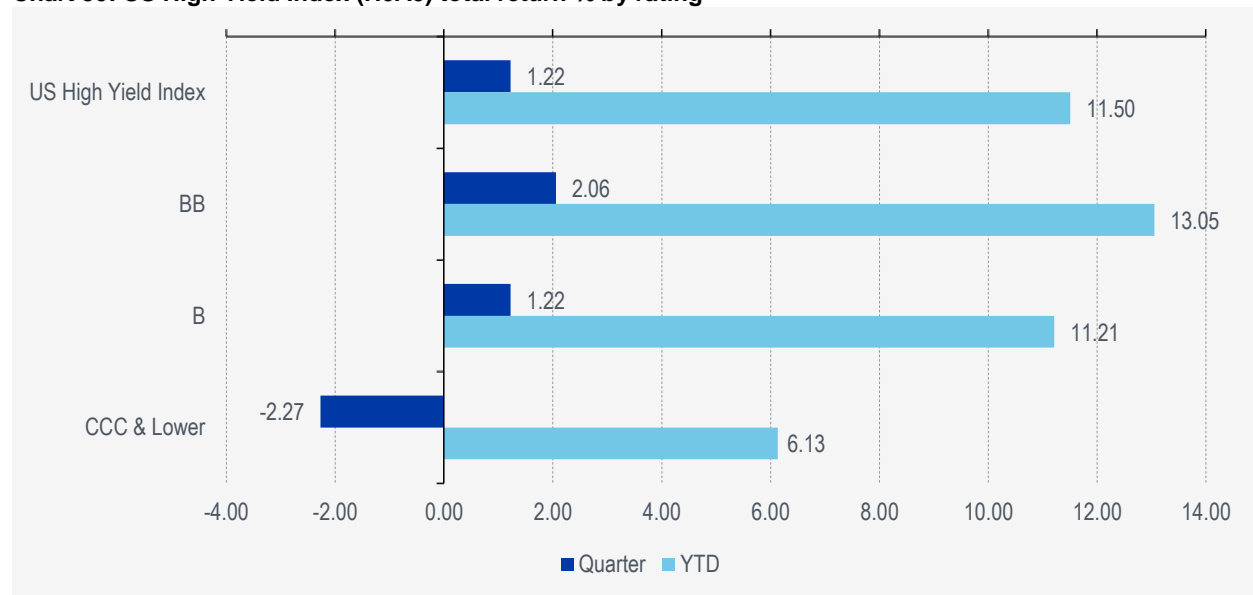
Index	Ticker	Ann. Total Return		Ann. Std. Dev.		Sharpe Ratio		Chg vs Prior Qtr	
		5yr	10yr	5yr	10yr	5yr	10yr	5yr	10yr
3-Month Treasury Bill	G001	0.98	0.54	0.26	0.23				
US Treasury	G0Q0	3.06	3.16	3.90	3.82	0.16	0.20	0.01	-0.01
Global High Yield	HW00	5.42	8.05	5.03	5.89	0.25	0.36	0.03	-0.03
Original Issue High Yield	HWHY	5.01	7.50	4.99	5.80	0.23	0.34	0.03	-0.03
Fallen Angels	HWFA	7.11	10.17	5.38	6.44	0.32	0.42	0.02	-0.03
US High Yield	H0A0	5.36	7.85	5.41	5.86	0.23	0.36	0.03	-0.03
BB	H0A1	5.93	7.90	4.57	5.06	0.31	0.41	0.05	-0.03
B	H0A2	5.01	7.36	5.53	5.72	0.21	0.34	0.03	-0.03
C	H0A3	4.44	8.33	9.86	9.90	0.11	0.23	0.01	-0.05
US Original Issue HY	H0HY	5.00	7.42	5.29	5.84	0.22	0.34	0.04	-0.03
US Fallen Angels	H0FA	7.74	10.35	6.55	6.37	0.30	0.43	0.02	-0.03
US Non-Distressed	H0ND	5.69	7.76	4.43	5.04	0.30	0.41	0.05	-0.02
US Distressed	H0DI	-5.69	2.56	17.93	16.11	-0.08	0.06	0.00	-0.07
US High Yield Constrained	HUC0	5.37	7.84	5.40	5.85	0.24	0.36	0.03	-0.03
European Currency High Yield	HP00	4.78	8.30	4.29	6.89	0.26	0.32	0.02	-0.04
European Currency HY Constr	HPC0	4.78	8.32	4.29	6.96	0.25	0.32	0.02	-0.04
Euro High Yield	HE00	4.44	7.78	4.49	6.85	0.22	0.30	0.02	-0.04
Euro High Yield Constrained	HEC0	4.43	7.82	4.48	6.92	0.22	0.30	0.02	-0.04
Sterling High Yield	HL00	6.55	11.12	3.76	7.77	0.42	0.38	0.06	-0.03
European Issuers High Yield	HWP0	5.64	8.41	4.07	6.68	0.33	0.34	0.05	-0.03
European Issuers HY Constr	HQ0C	5.62	8.40	4.07	6.72	0.33	0.33	0.05	-0.03
Global HY & EM Plus	HA00	5.02	7.53	4.54	5.30	0.26	0.37	0.02	-0.04
EM External Sovereigns	EMGB	4.97	6.38	4.96	5.49	0.23	0.31	0.01	-0.04
EM External Corporates	EMCB	4.74	6.23	3.85	4.60	0.28	0.35	0.03	-0.03

Note: Reverse highlighted values represent the top three performing sectors in each respective period; shaded values are the bottom three performing sectors.

## US High Yield Index (H0A0)

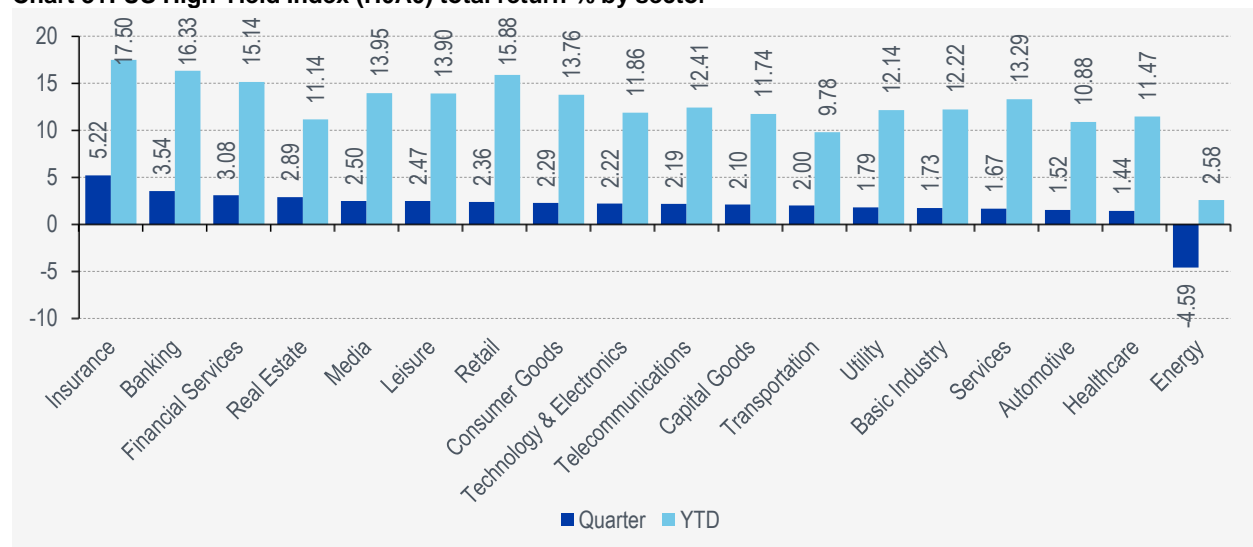
*Helped by the yield curve rally the BB segment came out on top in Q3, with the lowest-rating band posting a loss. YTD the CCC and lower segment has less than half the return of BBs.*

**Chart 30: US High Yield Index (H0A0) total return % by rating**



*Energy was the only sector in the red for Q3 and lags most other sectors by at least 10% YTD.*

**Chart 31: US High Yield Index (H0A0) total return % by sector**





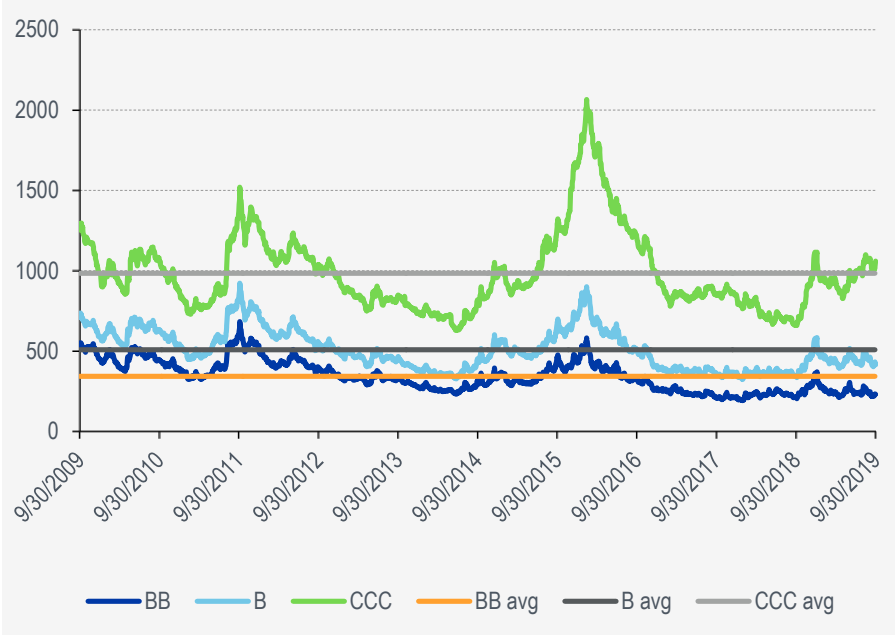
*The best sector rallies came in Food & Drug Retail (-78bp) and Cable/Satellite TV (-72bp). The latter is now near its 10-year spread low. Publishing widened the most QoQ (+281bp), and is one of relatively few sectors with a spread above its 10-year average.*

**Table 18: US High Yield Index sector spreads**

Sector	Ticker	Current	QoQ chng	YoY chng	Current spread multiple vs		
					10yr high	10yr low	10yr avg
Aerospace	H0AE	350	-39	82	0.4	1.3	0.7
Air Transportation	H0AI	193	-26	-45	0.2	1.0	0.4
Automotive & Auto Parts	H0AU	411	25	69	0.5	2.0	1.0
Banks & Thrifts	H0BA	234	-23	9	0.2	1.3	0.6
Broadcasting	H0BR	251	-12	-12	0.2	1.0	0.4
Building Materials	H0BL	316	1	33	0.3	1.5	0.7
Cable/Satellite TV	H0CV	213	-72	-96	0.3	1.0	0.6
Capital Goods	H0CA	405	4	43	0.5	1.4	0.9
Chemicals	H0CH	344	20	75	0.4	1.4	0.7
Consumer Products	H0CO	375	-33	1	0.4	1.1	0.7
Containers	H0CT	268	11	35	0.3	1.2	0.7
Div. Financial Services	H0FI	333	-43	43	0.2	1.2	0.7
Div Media	H0DM	256	-12	-39	0.3	1.1	0.5
Energy	H0EN	717	87	344	0.4	2.1	1.2
Entertainment/Film	H0ET	317	-23	56	0.4	1.4	0.7
Environmental	H0EV	245	-40	-7	0.3	1.2	0.5
Food & Drug Retail	H0FR	590	-78	32	0.7	1.6	1.0
Food/Beverage/Tobacco	H0FO	415	-22	70	0.5	1.6	1.0
Gaming	H0AG	240	-35	-34	0.2	1.1	0.4
Healthcare	H0HL	422	-3	102	0.6	1.4	0.9
Homebuilders/Real Estate	H0HB	299	-35	17	0.3	1.4	0.7
Hotels	H0AH	209	-34	-37	0.4	1.0	0.7
Insurance	H0IN	440	-58	87	0.5	1.4	0.9
Leisure	H0LE	278	-42	3	0.4	1.1	0.6
Metals/Mining	H0ME	441	1	112	0.3	1.5	0.7
Paper	H0PA	384	34	141	0.4	1.6	0.7
Publishing/Printing	H0PU	880	281	400	0.7	2.0	1.2
Railroad	H0RA	308	-16	67	0.3	2.8	0.6
Restaurants	H0RE	215	-41	-59	0.2	1.0	0.4
Services	H0SE	382	-17	23	0.4	1.2	0.7
Steel	H0ST	406	20	154	0.3	2.0	0.8
Super Retail	H0SR	509	-8	-40	0.6	1.2	0.9
Technology	H0TY	314	22	68	0.3	1.4	0.6
Telecom	H0TC	444	-31	51	0.5	1.3	0.9
Transportation Ex Air/Rail	H0SH	725	20	137	0.6	1.5	0.9
Utilities	H0EL	260	-14	-17	0.3	1.0	0.4
US High Yield Index	H0A0	0	-407	-328	0.0	0.0	0.0

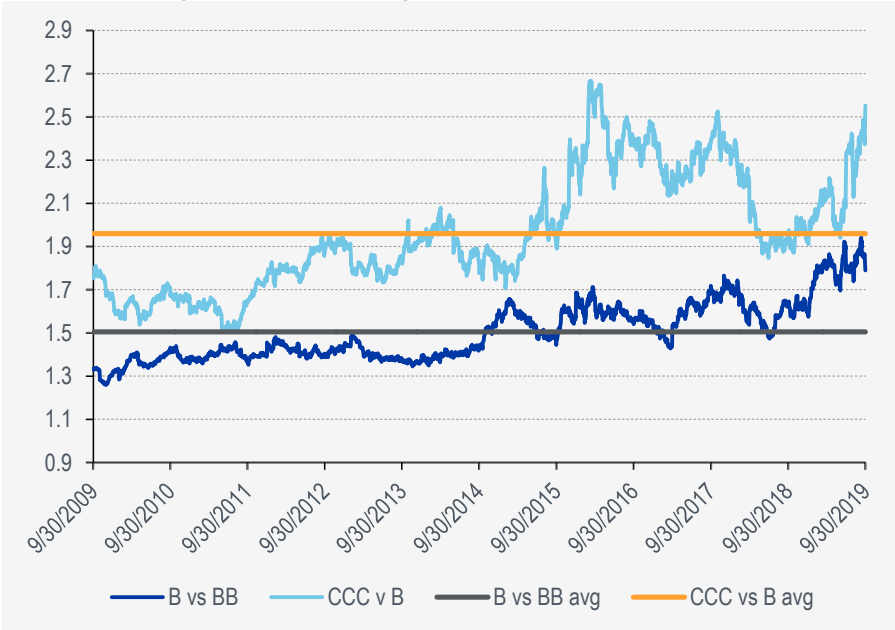
*The CCC and lower spread is the only one above its 10-year average.*

**Chart 32: US High Yield Index rating spreads**



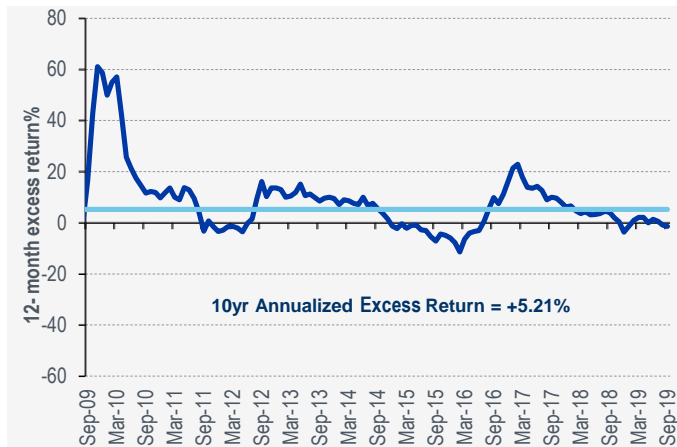
*Both the CCC-B and B-BB spread multiples continued to push higher in Q3. The B-BB spread gap was already at historic highs, but the CCC-B multiple is now close to its own historical high.*

**Chart 33: US High Yield Index rating spread multiples**



*The 10-year annualized excess return continues to decline, as does the standard deviation of excess returns, as the post-crisis rally rolls out of the observation window. Meanwhile, the 12-month excess return has slipped into negative territory, as the index has lagged risk-matched Treasuries by 1.41% over the last year.*

**Chart 34: US High Yield Index 12-month excess return**



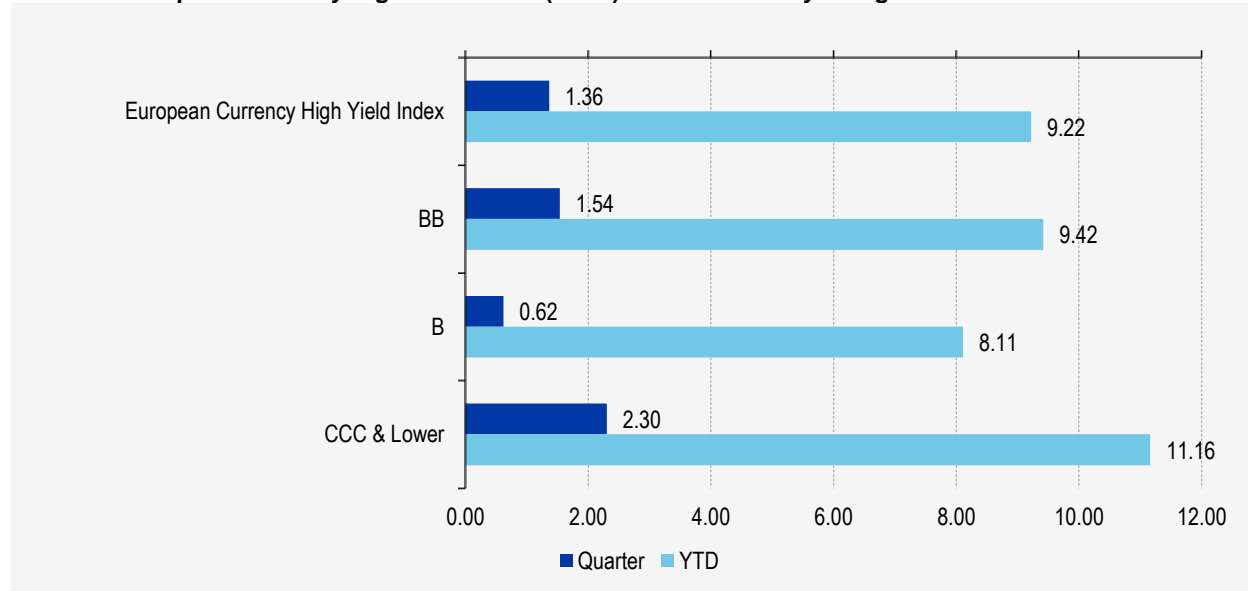
**Table 18: US High Yield Excess Returns**

10yr Ann. Excess Return	5.21
Current	-1.41
Hi (Nov-09)	61.08
Lo (Feb-16)	-11.40
Std. Dev	13.22

## European High Yield Indices

*Unlike its US counterpart, the European Currency High Yield Index saw the lowest-rated tier post the best results in Q3. Now in double-digits YTD, CCCs have outperformed next-best BBs by about 1.5% so far in 2019.*

**Chart 35: European Currency High Yield Index (HP00) total return % by rating**



**Chart 36: European Currency High Yield Index (HP00) total return % by sector**

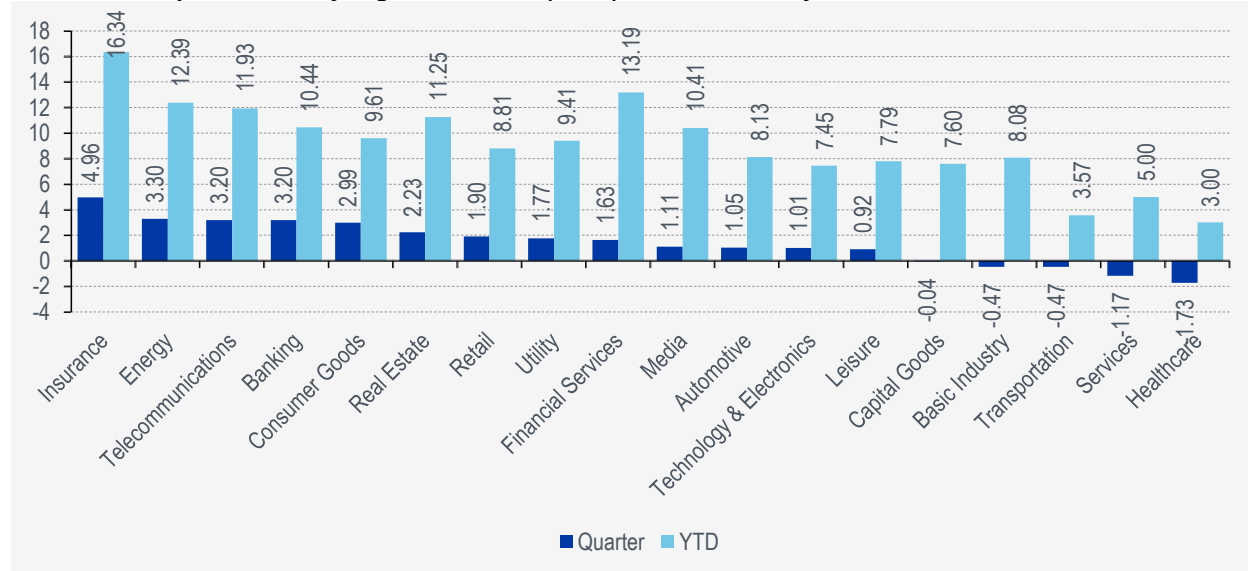


Chart 37: European high yield currency spreads

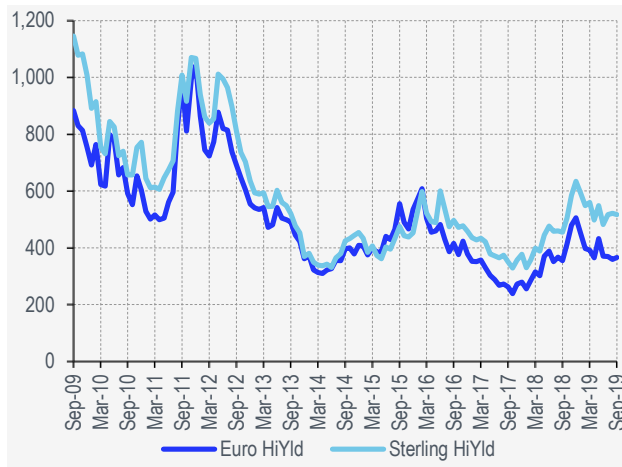
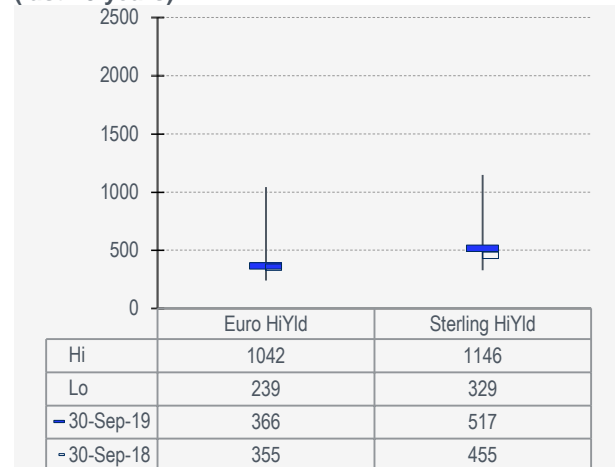


Chart 38: European high yield currency spread range (last 10 years)

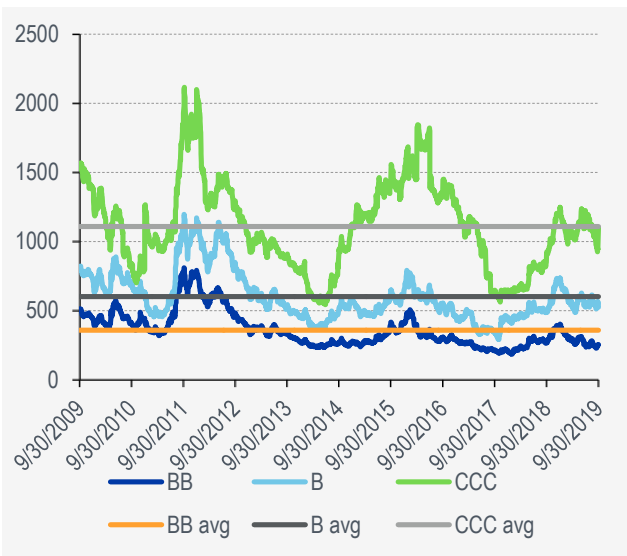


*Transportation widened the most in Q3 (+120bp), and is now at its 10-year spread high. Transport is also the only sector anywhere near its high.*

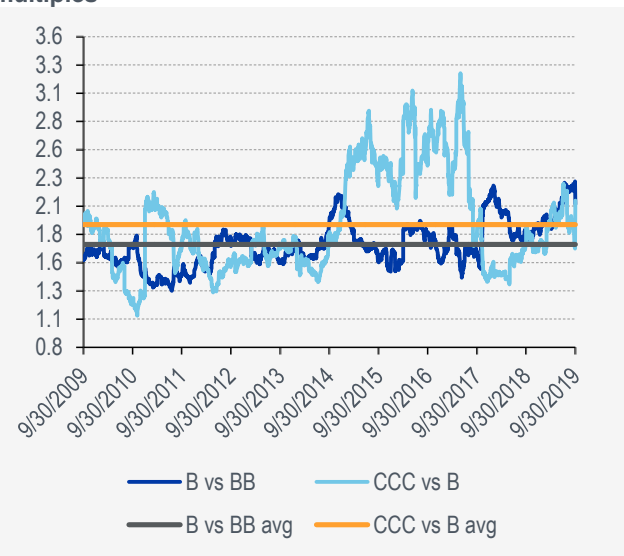
Table 19: European Currency High Yield Index (HP00) sector spreads

Sector	Current	QoQ chg	YoY chg	Current spread multiple vs		
				10yr high	10yr low	10yr avg
Automotive	376	5	117	0.5	2.1	1.1
Banking	327	4	-5	0.2	1.7	0.6
Basic Industry	440	30	86	0.5	1.9	1.0
Capital Goods	306	35	-13	0.3	1.3	0.7
Consumer Goods	631	-16	201	0.7	2.4	1.2
Energy	307	-9	-62	0.4	1.3	0.7
Financial Services	471	-5	-13	0.5	1.5	0.9
Healthcare	452	42	120	0.6	1.4	1.0
Insurance	405	-39	-41	0.3	1.3	0.8
Leisure	425	-8	29	0.4	1.5	0.7
Media	328	21	-71	0.3	1.2	0.6
Real Estate	312	-9	6	0.2	1.5	0.6
Retail	576	-41	33	0.4	2.0	0.9
Services	411	-68	32	0.3	1.4	0.7
Technology & Electronics	295	40	-19	0.2	1.3	0.7
Telecommunications	256	-38	-45	0.2	1.3	0.5
Transportation	794	120	253	1.0	2.5	1.5
Utility	208	-17	-72	0.2	1.1	0.5
European Currency High Yield Index	383	-1	16	0.4	1.5	0.8

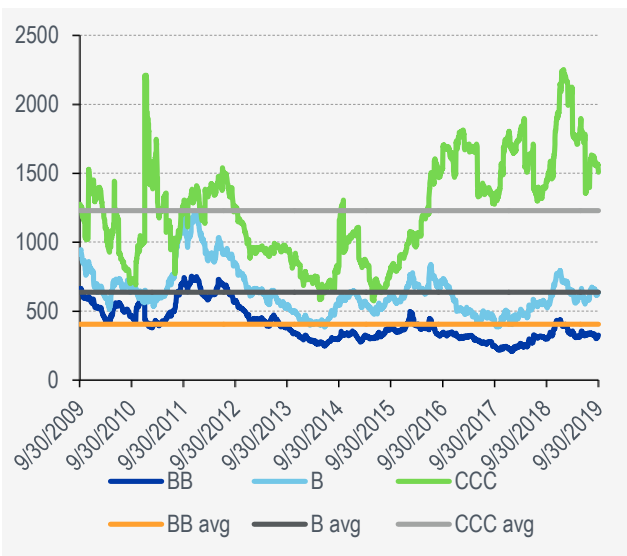
**Chart 39: Euro High Yield Index rating spreads**



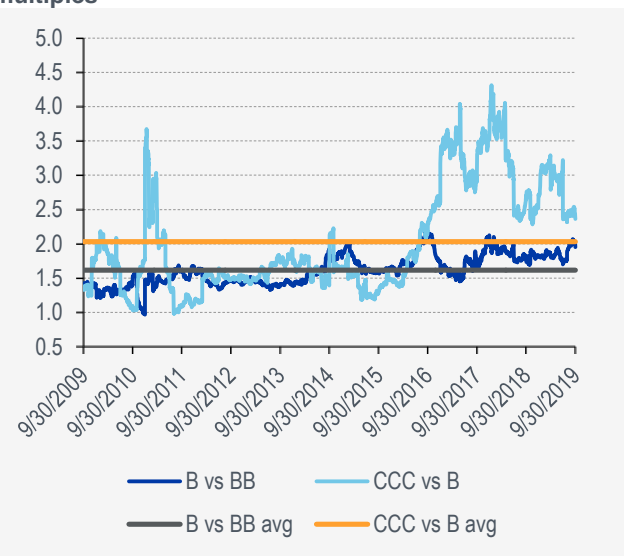
**Chart 40: Euro High Yield Index rating spread multiples**



**Chart 41: Sterling High Yield Index rating spreads**

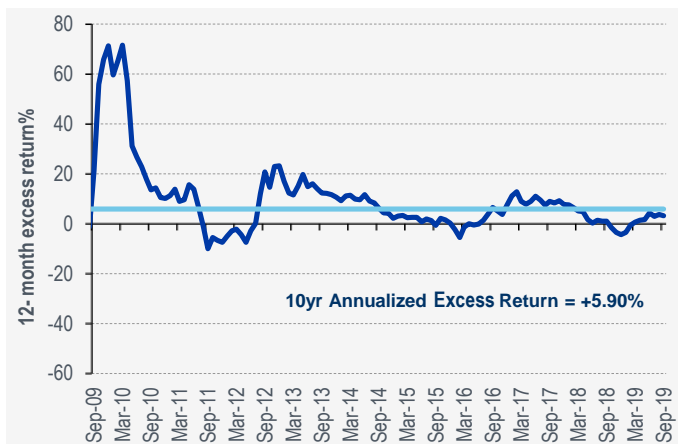


**Chart 42: Sterling High Yield Index rating spread multiples**



*The last 12 month excess return slipped lower but is still a robust +3.19%. That seems low compared to the 10-year annualized excess return, but that number remains inflated due to the post-crisis rally and will continue to decline.*

**Chart 43: Euro High Yield Index 12-month excess return**

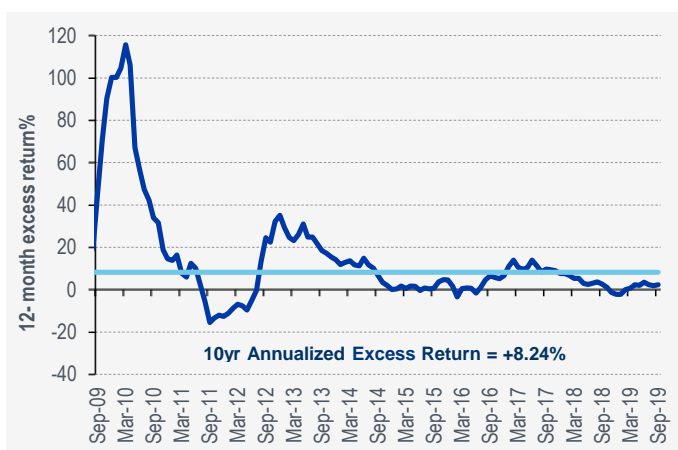


**Table 20: Euro High Yield Excess Returns**

10yr Ann. Excess Return	5.90
Current	3.19
Hi (Mar-10)	71.63
Lo (Sep-11)	-10.00
Std. Dev	15.50

*Sterling's last 12-month excess return is now 2.24%, or roughly half its current spread.*

**Chart 44: Sterling Yield Index 12-month excess return**



**Table 21: Sterling High Yield Excess Returns**

10yr Ann. Excess Return	8.24
Current	2.24
Hi (Mar-10)	115.74
Lo (Sep-11)	-15.49
Std. Dev	25.07

# Emerging Markets

## Overview

*After a very strong first half, the EM indices slowed to a crawl in Q3 but managed to stay above water.*

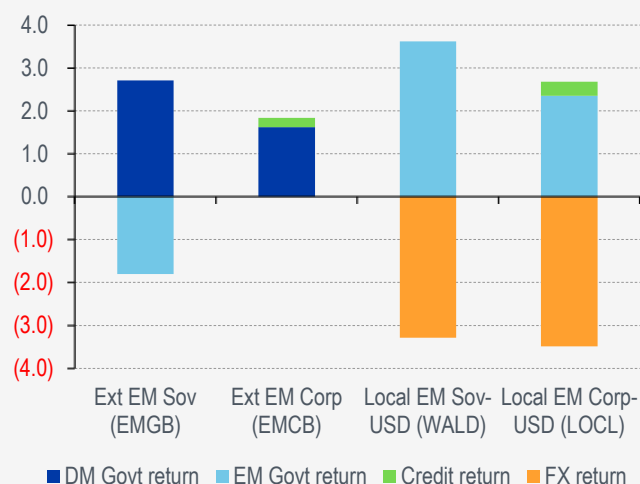
After gaining about 4% in each of the two prior quarters, the composite Emerging Markets index – comprised of local and external, sovereign and non-sovereign debt – slowed to a crawl in Q3. But it managed to keep its head above water as a 0.59% return marked its fifth straight quarterly gain and the tenth positive result in the last eleven quarters. The small gain gave the index an 8.87% YTD return and, short of a major loss in Q4, 2019 is in line to produce the second best full year return in the index's brief seven year history.

Given the index's short track record we cannot rule out a setback in Q4. Prior to 2019 the index has gained 4% or more in a half four times. Three times it followed that large gain with a loss in the next half. Only once has it followed a 4+% half with a positive return of any magnitude (H2 2017), though it was in the red the very next half.

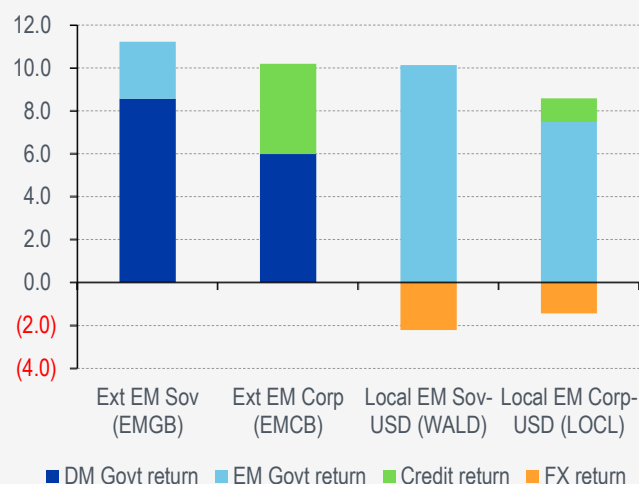
*External non-sovereigns led the pack as they managed to match their historical average quarterly return.*

There was a wide range of performances across the Emerging Markets in Q3. External non-sovereigns led the pack with a 1.83% return for the quarter. That is well below the 5.01% and 3.05% returns it earned in Q1 and Q2, respectively. But at the same time it is exactly equal to the average quarterly return over the index's 21 year history. And coming on the heels of the particularly strong H1 results that is an impressive accomplishment.

**Exhibit A: EM index return attributions – QTD**



**Exhibit B: EM index return attributions – YTD**





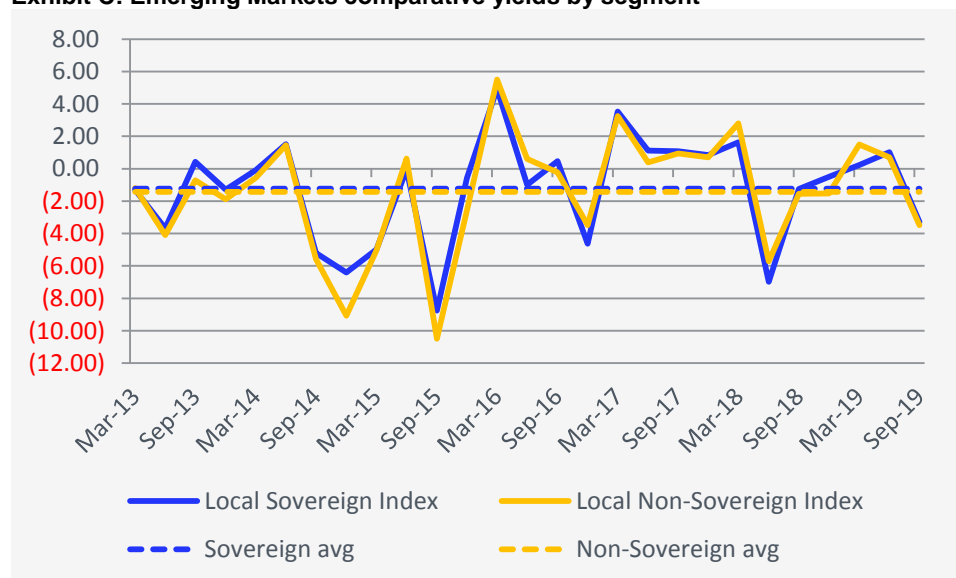
*External sovereigns gained half as much as their non-sovereign peers as heavy losses in Argentina took a heavy toll.*

External sovereigns gained only half as much as their external non-sovereign peers (0.91% vs. 1.83%) and Argentina was the sole source of the underperformance. Argentina suffered a massive sell-off that started when the country's president came in a distant second in primaries held on August 11. Just over two weeks later the country's Treasury Minister announced that it will be negotiating with bondholders and the IMF to extend maturities on all local-law debt. By the end of the quarter Argentina's external sovereign debt was down 41% relative to mid-year and though they were not hit as hard, the fallout sent Argentine non-sovereigns 26% lower on the quarter. On top of that, the external sovereign index had nearly three times as much exposure to Argentina as the non-sovereign index (4.72% vs. 1.73%). Take away Argentina and the external sovereign index actually outperformed external non-sovereigns (3.04% vs. 2.34%).

*The local indices fell way behind their external peers as they each lost more than 3% on the FX translation.*

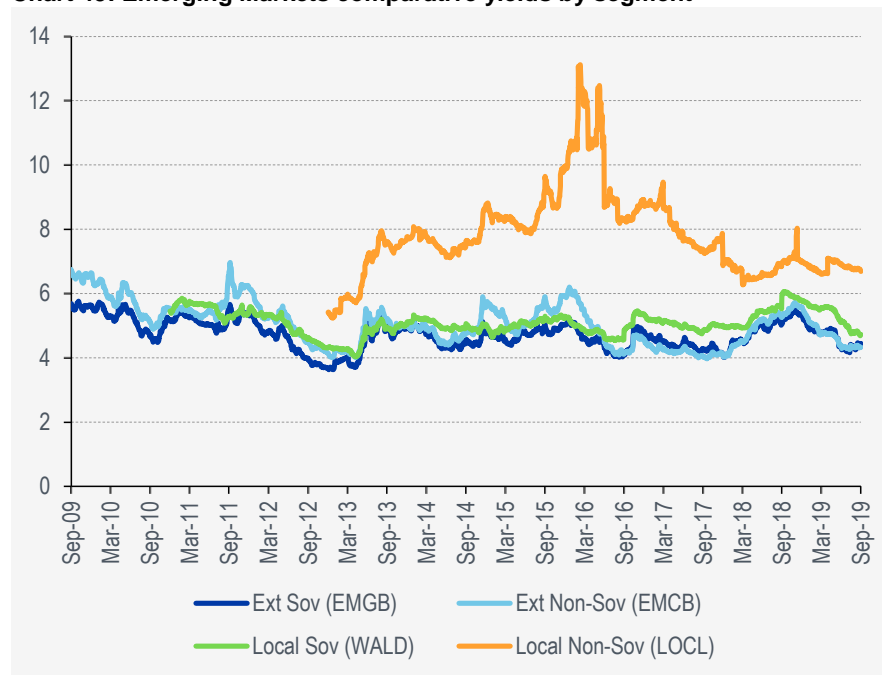
The two local indices fell way behind their external peers, with or without Argentina included, as both local indices lost more than 3% on the FX translation. The local indices had enjoyed two straight quarters of FX gains in H1 but at 1.25% and 2.21% in H1 FX gains for the sovereign and non-sovereign indices, respectively, there was not enough in the bank to offset the Q3 losses. Sizable currency losses are nothing new for the local indices. Over the last seven years the indices have suffered quarterly currency losses about 60% of the time. And the average quarterly FX return is -1.23% and -1.43% for the local sovereign and non-sovereign indices, respectively.

**Exhibit C: Emerging Markets comparative yields by segment**



*While the local currency sovereign index yield fell 44bp QoQ, the non-sovereign yield dropped just 24bp. The yield of the external debt indices were little changed in Q3.*

**Chart 45: Emerging Markets comparative yields by segment**



*The 5- and 10-year Sharpe ratios moved in opposite directions QoQ. The ratios for both time periods are now remarkably similar.*

**Table 22: Five- and Ten-Year Sharpe Ratios (as of 30 Sep 2019)**

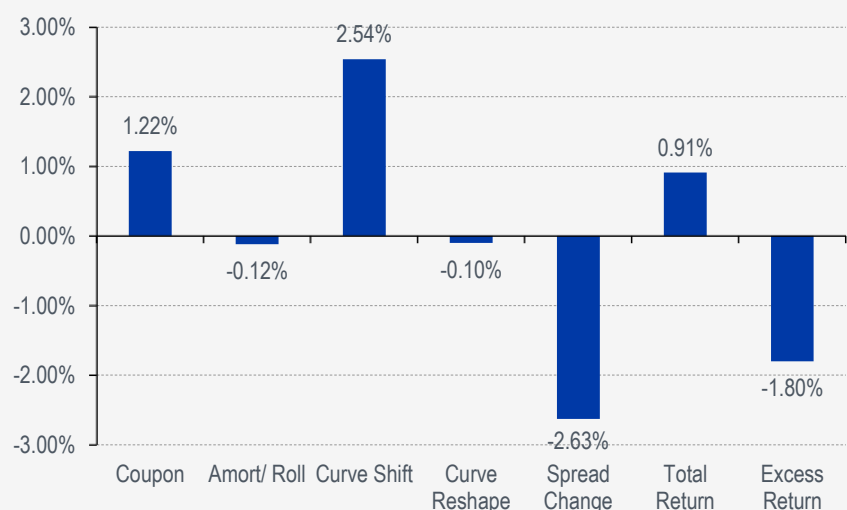
Index	Ticker	Ann. Total Return		Ann. Std. Dev.		Sharpe Ratio		Chg vs Prior Qtr	
		5yr	10yr	5yr	10yr	5yr	10yr	5yr	10yr
3-Month Treasury Bill	G001	0.98	0.54	0.26	0.23				
US Treasury	G0Q0	3.06	3.16	3.90	3.82	0.16	0.20	0.01	-0.01
<b>External DM+EM Sov</b>									
BBB & Lower	IP00	4.95	6.58	5.60	6.11	0.21	0.29	0.01	-0.04
BB & Lower	IG00	4.29	7.20	7.70	7.69	0.13	0.25	-0.02	-0.06
BBB-B	IQ00	4.87	6.47	5.53	6.07	0.21	0.28	0.01	-0.04
<b>USD DM+EM External Sov</b>									
BBB & Lower	IGOV	5.15	6.69	5.78	6.36	0.21	0.28	0.01	-0.04
BBB	I5GV	5.53	6.32	5.75	6.28	0.23	0.27	0.03	-0.02
BB	I1GV	7.76	8.95	5.70	6.15	0.34	0.39	0.02	-0.02
B	I2GV	2.57	6.17	9.02	9.96	0.06	0.17	0.00	-0.06
CCC & Lower	I3GV	7.44	9.00	18.10	16.06	0.13	0.17	0.01	-0.04
BB-B	I4GV	4.56	7.09	7.13	7.43	0.15	0.26	-0.01	-0.05
BB & Lower	IGD0	4.58	7.17	7.61	7.69	0.14	0.25	0.00	-0.05
BBB-B	IQD0	5.06	6.60	5.70	6.33	0.21	0.28	0.01	-0.04
<b>EM External Sovereigns</b>									
EM External Corporates	EMGB	4.97	6.38	4.96	5.49	0.23	0.31	0.01	-0.04
EM Corp+	EMCB	4.74	6.23	3.85	4.60	0.28	0.35	0.03	-0.03
EM Liquid Corp+	EMCL	5.17	6.39	4.13	4.88	0.29	0.34	0.03	-0.03
AAA-A	EM1R	4.47	5.20	2.92	3.17	0.34	0.42	0.01	-0.04
BBB	EM2R	4.76	6.29	4.45	5.19	0.24	0.32	0.04	-0.03
BB & Lower	EMHY	5.74	7.80	7.04	8.21	0.20	0.26	0.01	-0.05
BB	EM3R	6.43	8.12	5.48	7.01	0.29	0.31	0.02	-0.03
B & Lower	EM4R	4.77	7.25	10.54	10.78	0.12	0.19	0.00	-0.06
BBB-BB	EMXO	5.53	6.97	4.62	5.65	0.28	0.33	0.03	-0.03
Financial	EMFL	4.99	6.27	3.20	4.17	0.36	0.39	0.03	-0.03
Non-Financial	EMNF	4.81	6.28	4.87	6.15	0.23	0.27	0.02	-0.04
Public Sector	EMPU	5.48	6.46	4.23	4.65	0.30	0.36	0.04	-0.03
Private Sector	EMPV	4.88	6.38	4.16	5.49	0.27	0.31	0.02	-0.04
Latin America	EMLL	4.94	6.63	7.11	7.01	0.17	0.25	0.01	-0.04
EMEA	EMEL	5.73	6.71	4.36	5.04	0.31	0.35	0.05	-0.03
Asia	EMAL	4.79	5.92	2.93	4.13	0.37	0.37	0.01	-0.03
<b>Global HY &amp; EM</b>									
Global High Yield	HA00	5.02	7.53	4.54	5.30	0.26	0.37	0.02	-0.04
	HW00	5.42	8.05	5.03	5.89	0.25	0.36	0.03	-0.03

Note: Reverse highlighted values represent the top three performing sectors in each respective period; shaded values are the bottom three performing sectors.

## Emerging Markets External Sovereign

*The gains from the yield curve rally in Q3 were almost completely offset by the impact of spread widening (2.44% vs -2.63%).*

**Chart 46: External EM Sovereign Index (EMGB) quarterly return attribution**



*Spreads widening in QoQ (+33bp) ended up dragging the index yield modestly higher despite the underlying yield curve rally.*

**Chart 47: External EM Sovereign Index (EMGB) yield/spread**



*The external debt EM sovereign index lagged risk-matched benchmark debt by just over 1% over the last 12 months. Over the longer haul, the 10-year annualized excess return is a solid +2.65%, and well-matched to the 285bp average index spread over that period.*

**Chart 48: External EM Sovereign Index (EMGB) 12-month excess return**



**Table 23: External EM Sovereign Index (EMGB) quarterly returns; current stats**

Country	Total Return	Excess Return	Effective Yield	OAS	% weight
Albania	1.67	1.27	1.50	224	0.09
Angola	(1.19)	(3.97)	7.87	614	0.52
Argentina	(41.46)	(43.91)	26.06	2,498	2.64
Armenia	2.31	1.27	3.96	234	0.10
Azerbaijan	2.80	0.35	3.63	198	0.25
Bahamas	(0.01)	(2.14)	5.07	344	0.14
Bahrain	4.92	2.76	4.74	306	1.33
Belarus	0.43	(1.38)	5.22	360	0.21
Belize	(0.78)	(3.28)	11.05	1,186	0.03
Benin	1.74	1.23	5.16	593	0.05
Bolivia	0.30	(1.17)	4.43	283	0.19
Brazil	3.03	(0.07)	3.71	203	3.44
Bulgaria	2.42	1.31	0.10	81	0.79
Cameroon	3.04	1.80	7.26	566	0.08
Chile	3.11	0.12	1.47	83	1.38
China	2.61	0.19	2.19	52	0.51
Colombia	4.46	0.70	3.28	160	2.97
Costa Rica	1.14	(2.16)	6.32	450	0.37
Croatia	2.56	1.39	1.07	93	1.40
Czech Republic	0.16	0.27	(0.32)	46	0.64
Dominican Republic	2.02	(0.88)	4.92	317	1.40
Ecuador	(1.26)	(2.77)	8.07	645	1.95
Egypt	2.19	(0.18)	6.15	483	2.65
El Salvador	4.30	1.84	6.24	451	0.67
Ethiopia	1.43	0.10	5.71	411	0.10
Gabon	1.07	(0.13)	6.91	532	0.21
Georgia	1.94	1.33	3.08	138	0.05

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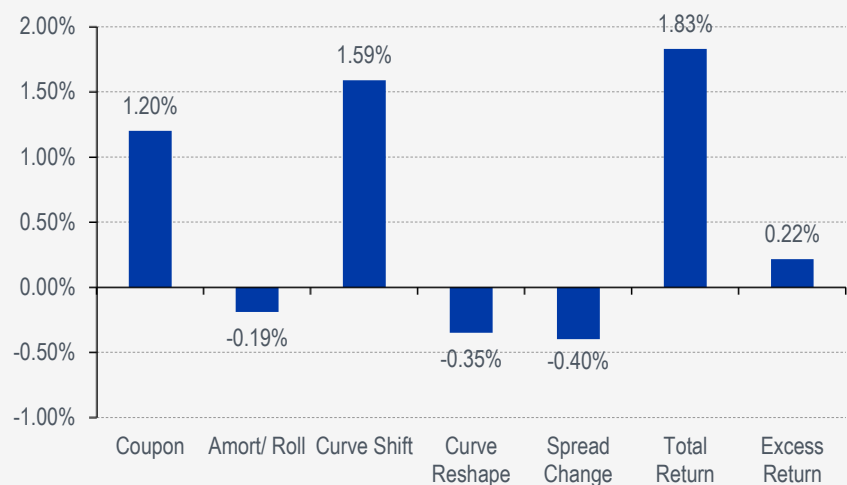
**Table 23: External EM Sovereign Index (EMGB) quarterly returns; current stats**

Country	Total Return	Excess Return	Effective Yield	OAS	% weight
Ghana	0.70	(1.88)	7.42	571	0.65
Guatemala	4.87	1.99	4.21	250	0.43
Honduras	2.10	0.84	4.15	249	0.18
Hong Kong	1.02	(0.28)	1.92	34	0.10
Hungary	1.85	0.25	2.07	81	1.32
Indonesia	3.66	0.82	2.89	146	7.07
Iraq	0.68	(0.04)	6.28	468	0.35
Israel	5.09	1.79	1.44	82	1.59
Ivory Coast	4.01	1.83	5.62	478	0.68
Jamaica	6.36	3.11	4.93	311	0.62
Jordan	3.01	0.02	5.86	411	0.30
Kazakhstan	3.09	(0.14)	2.76	132	0.86
Kenya	0.90	(1.43)	6.61	494	0.61
Kuwait	1.40	(0.16)	2.31	69	0.79
Lebanon	(13.65)	(15.64)	15.22	1,357	1.61
Macedonia	2.38	2.20	0.91	170	0.17
Malaysia	3.71	0.62	2.51	75	0.39
Mexico	4.07	0.38	3.02	185	6.62
Mongolia	0.47	(0.41)	5.24	364	0.29
Montenegro	3.61	3.02	2.00	276	0.06
Morocco	1.55	0.17	1.90	140	0.46
Namibia	1.44	0.22	4.60	298	0.12
Nigeria	2.04	(0.94)	6.81	508	1.09
Oman	5.69	3.33	5.47	378	2.10
Pakistan	0.25	(1.22)	6.33	471	0.52
Panama	4.26	0.34	3.00	123	1.75
Papua N. Guinea	1.24	(1.06)	7.49	585	0.05
Paraguay	2.31	(1.77)	3.99	216	0.42
Peru	3.74	(0.12)	2.47	112	1.51
Philippines	3.86	0.44	2.47	83	3.01
Poland	1.99	0.62	0.48	57	4.27
Qatar	4.86	0.94	2.89	108	4.48
Romania	3.16	0.80	1.89	190	3.05
Russia	4.95	1.50	3.38	193	4.09
Rwanda	3.72	2.81	4.23	265	0.04
Saudi Arabia	5.15	1.69	2.94	129	6.51
Senegal	4.31	1.67	5.32	425	0.39
Serbia	2.63	1.32	1.91	115	0.27
South Africa	0.09	(3.01)	4.60	296	1.72
South Korea	3.18	0.19	1.87	56	0.75
Sri Lanka	0.89	(0.68)	6.65	502	1.43
Suriname	(1.52)	(3.17)	11.51	989	0.05
Trinidad & Tobago	4.16	2.48	3.75	214	0.15
Tunisia	(1.30)	(1.88)	7.03	713	0.30
Turkey	4.63	2.35	5.87	442	6.13
UAE	2.91	0.44	2.66	92	3.15
Ukraine	2.66	1.12	6.61	514	1.59
Uruguay	4.97	0.07	3.54	167	1.37
Uzbekistan	1.79	(0.30)	3.85	223	0.10
Vietnam	4.02	2.64	2.80	120	0.10
Zambia	8.54	7.34	17.56	1,596	0.21
Total	0.91	(1.80)	4.45	313	100.00

## Emerging Markets External Non-Sovereign

*It was a good quarter for total return, but the modest excess return reveals that very little was attributed to the EM risk factor.*

**Chart 49: External EM Corporate Plus Index (EMCB) quarterly return attribution**



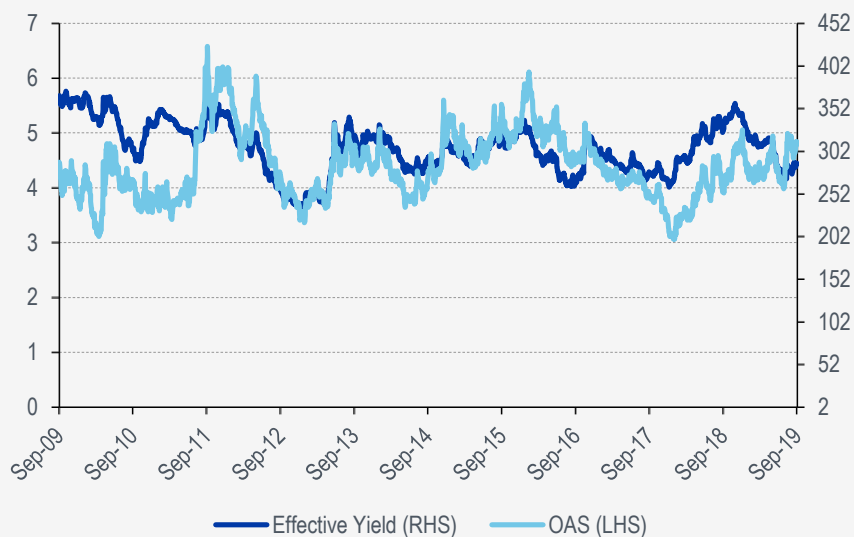
*The High Yield sector was the big laggard in Q3, and the only major segment to suffer a loss. Investment Grade was the best across all segments, with EMEA outperforming among the regions.*

**Chart 50: External EM Non-Sovereign Index returns**



*The index spread widened 13bp QoQ, which was not enough to keep the yield from falling modestly due to the underlying yield curve rally.*

**Chart 51: External EM Corporate Plus Index (EMCB) yield/spread**



*The 12-month excess return has been positive since March and now stands at 1.93%. That is low compared to both the 3.37% 10-year annualized excess return, and the 285bp index spread.*

**Chart 52: External EM Corporate Plus (EMCB) 12-month excess return**





**Table 24: External EM Corporate Plus Index (EMCB) quarterly returns; current stats**

Country	Total Return	Excess Return	Effective Yield	OAS	% weight
Argentina	(25.61)	(26.91)	22.51	2,122	1.28
Azerbaijan	1.31	(0.43)	4.06	245	0.27
Bahrain	4.92	3.46	4.95	333	0.29
Barbados	0.21	(0.86)	6.69	507	0.08
Belarus	1.98	1.00	5.77	418	0.06
Brazil	3.31	1.43	4.28	266	8.36
Bulgaria	3.32	3.15	1.11	187	0.07
Cambodia	1.99	1.38	0.83	-86	0.02
Chile	2.48	(0.04)	3.79	211	3.01
China	1.44	0.14	4.39	288	28.87
Colombia	3.11	1.14	3.85	218	1.47
Congo, Demc Rep.	1.32	0.78	4.59	298	0.04
Costa Rica	1.43	(0.28)	5.99	430	0.13
Croatia	2.13	1.33	2.86	128	0.04
Czech Republic	2.53	2.00	1.43	198	0.83
Dominican Republic	1.69	0.57	5.59	397	0.06
Ecuador	2.01	0.76	8.39	664	0.05
El Salvador	3.42	2.68	5.17	359	0.04
Georgia	2.43	1.50	5.27	367	0.11
Ghana	2.48	1.46	5.53	393	0.14
Guatemala	2.07	1.16	4.18	258	0.16
Hong Kong	1.65	0.19	3.06	169	4.47
Hungary	0.96	0.71	1.31	131	0.16
India	2.16	0.74	3.85	230	4.25
Indonesia	3.11	0.36	4.20	249	2.78
Israel	(4.55)	(6.14)	7.02	588	1.46
Jamaica	(3.29)	(4.08)	32.61	3,104	0.18
Kazakhstan	2.81	(0.32)	4.96	321	0.90
Kuwait	2.06	0.93	3.28	161	0.45
Macau	3.38	1.80	3.48	187	0.41
Malaysia	2.45	0.56	3.03	135	1.02
Mauritius	0.99	0.41	8.98	739	0.05
Mexico	4.53	2.16	4.46	312	9.93
Mongolia	(0.64)	(1.60)	8.77	718	0.08
Morocco	4.56	2.23	3.90	221	0.20
Nigeria	3.11	2.53	6.23	462	0.19
Oman	4.43	2.87	5.35	374	0.31
Panama	3.73	1.13	3.70	201	0.44
Paraguay	3.87	2.57	3.65	202	0.02
Peru	2.43	(0.04)	3.91	217	1.86
Philippines	2.62	1.50	2.71	111	0.45
Poland	2.30	1.60	0.69	114	0.52
Qatar	2.22	0.83	3.39	167	1.07
Romania	2.64	2.49	1.42	221	0.22
Russia	2.99	2.02	3.24	193	4.40
Saudi Arabia	4.56	1.25	3.25	158	1.63
Singapore	1.57	0.08	3.45	198	2.03
South Africa	0.70	(0.55)	4.60	320	1.39
South Korea	1.71	0.52	2.40	91	4.92
Taiwan	1.93	0.45	2.98	137	0.19
Thailand	3.55	1.32	2.99	128	0.95
Togo	3.77	2.64	6.41	483	0.04
Trinidad & Tobago	2.81	0.02	5.18	349	0.07
Turkey	4.77	3.87	6.55	497	2.08
UAE	2.66	0.91	3.21	177	4.61
Ukraine	3.53	2.52	6.81	530	0.49
Uruguay	1.84	1.16	8.45	686	0.02
Vietnam	0.44	(0.51)	5.31	370	0.06
Zambia	3.44	2.49	7.50	589	0.32
Total	1.83	0.22	4.33	285	100.00

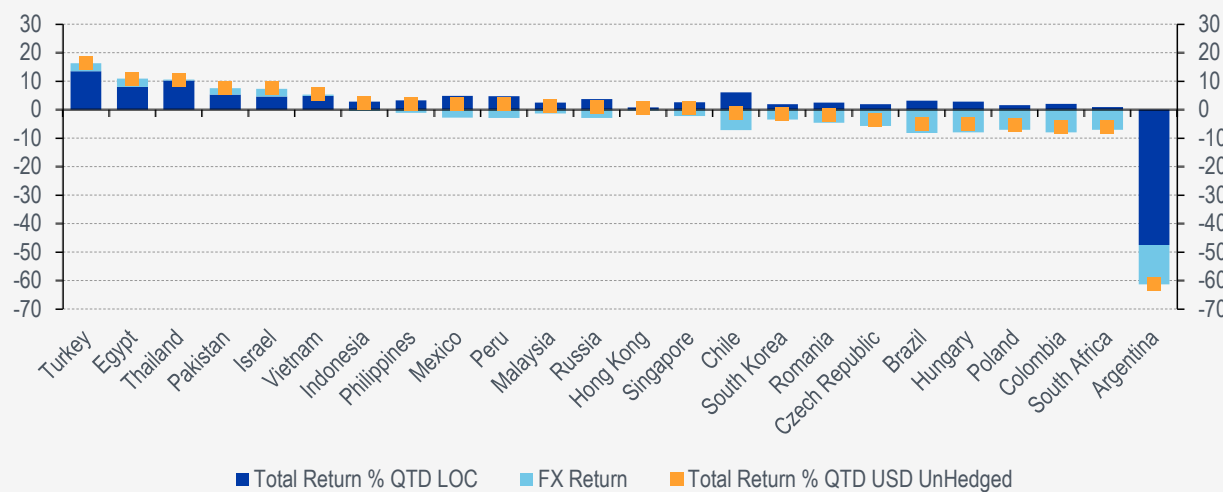
## Emerging Markets Local Sovereign

*The index yield moved sharply lower in Q3, and is now at 4.73% – one of the lowest levels seen in the last five years.*

**Chart 53: Diversified Local EM Sovereign Index (WALD) yield**



**Chart 54: Local Diversified EM Sovereign Index (WALD) 3-month returns by country**



**Table 25: Diversified Local EM Sovereign Index (WALD) quarterly returns; current stats**

Country	Local total return%	FX return%	USD total return%	Effective Yield	% weight
Argentina	(47.47)	(13.88)	(61.34)	80.58	0.12
Brazil	3.15	(8.24)	(5.09)	5.61	10.00
Chile	6.01	(7.17)	(1.16)	2.53	0.74
Colombia	1.98	(7.96)	(5.98)	5.31	2.82
Czech Republic	1.90	(5.75)	(3.86)	1.36	2.54
Egypt	7.98	2.85	10.83	14.52	2.29
Hong Kong	0.82	(0.35)	0.47	1.63	0.63
Hungary	2.82	(7.97)	(5.15)	0.95	2.13
Indonesia	2.74	(0.49)	2.25	7.16	7.39
Israel	4.61	2.73	7.34	0.79	3.01
Malaysia	2.44	(1.33)	1.10	3.40	8.98
Mexico	4.84	(2.83)	2.02	7.03	8.34
Pakistan	5.21	2.31	7.52	12.93	0.56
Peru	4.67	(2.97)	1.70	4.33	1.80
Philippines	3.21	(1.19)	2.03	4.55	4.27
Poland	1.61	(7.10)	(5.49)	1.69	5.49
Romania	2.49	(4.63)	(2.15)	3.57	1.70
Russia	3.72	(2.89)	0.83	6.73	4.82
Singapore	2.59	(2.22)	0.37	1.75	4.27
South Africa	0.87	(7.06)	(6.19)	9.03	5.18
South Korea	1.94	(3.54)	(1.60)	1.42	10.00
Thailand	10.24	0.30	10.54	1.58	8.25
Turkey	13.48	2.76	16.25	13.38	2.69
Vietnam	4.84	0.47	5.31	3.65	1.98
<b>Total</b>	<b>3.62</b>	<b>(3.29)</b>	<b>0.33</b>	<b>4.73</b>	<b>100.00</b>

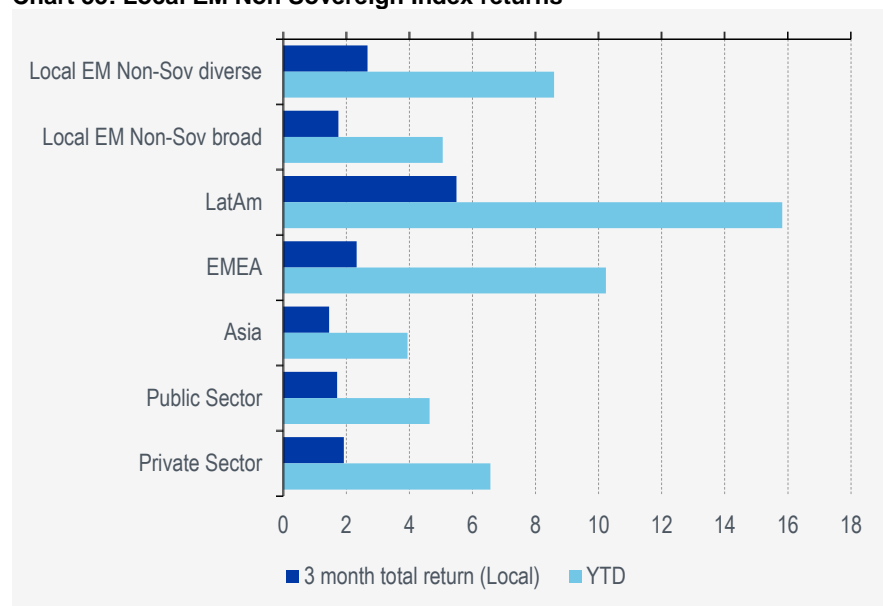
**Table 26: Diversified Local EM IL Sovereign Index (WILD) quarterly returns; current stats**

Country	Local total return%	FX return%	USD total return%	Effective Yield	% weight
Argentina	(36.36)	(16.81)	(53.17)	58.37	1.64
Brazil	4.08	(8.32)	(4.24)	1.88	20.00
Chile	8.74	(7.36)	1.38	0.10	9.94
Colombia	4.31	(8.14)	(3.83)	1.95	8.61
Israel	3.35	2.70	6.05	(0.30)	16.48
Mexico	2.41	(2.76)	(0.35)	3.35	20.00
South Africa	0.08	(7.00)	(6.93)	3.33	9.43
South Korea	(0.60)	(3.45)	(4.05)	0.29	1.76
Thailand	1.51	0.27	1.79	1.58	1.80
Turkey	4.52	2.55	7.06	3.70	10.34
<b>Total</b>	<b>2.25</b>	<b>(4.33)</b>	<b>(2.08)</b>	<b>2.86</b>	<b>100.00</b>

## Emerging Markets Local Non Sovereign

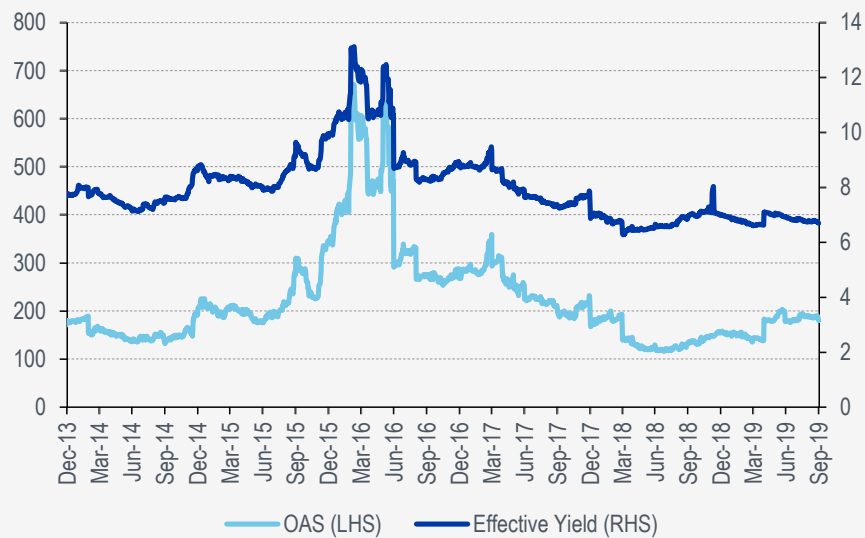
*The LatAm region was the obvious outperformer in Q3, taking over from EMEA the prior quarter. LatAm is also, by far, the best-performing index segment YTD.*

**Chart 55: Local EM Non Sovereign Index returns**



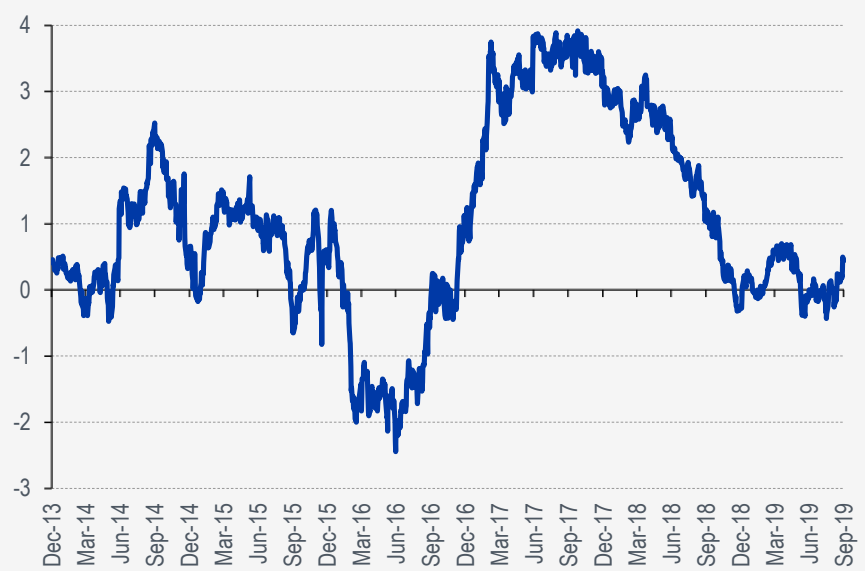
*The index yield continued to decline in Q3, but still stands at a robust 6.69%, or 40bp above the low set last year.*

**Chart 56: Diversified Local EM Non-Sovereign Index (LOCL) yield/spread**



*The 12-month excess return moved back into positive territory in Q3 and now stands at +0.44%, which is about half the 5-year annualized result (+0.90%).*

**Chart 57: Diversified Local EM Non-Sovereign Index (LOCL) 12 month excess return**



**Table 27: Diversified Local EM Non-Sovereign Index (LOCL) quarterly returns; current stats**

Currency	Total Return	Excess Return	Effective Yield	OAS	% weight
Brazilian Real	6.98	2.60	7.54	67	2.00
Chinese Renminbi (offshore)	1.06	0.23	5.17	236	5.48
Chinese Renminbi (inshore)	1.16	0.03	3.45	48	4.52
Colombian Peso	2.90	1.23	6.59	153	9.35
Czech Koruna	0.02	(0.78)	2.72	148	1.67
Hong Kong Dollar	1.43	0.19	2.88	132	10.00
Indian Rupee	2.61	(0.01)	8.18	206.00	9.89
Indonesia Rupiah*	2.61	0.39	9.86	362	2.20
Malaysian Ringgit	1.50	(0.24)	4.19	71	5.43
Mexican Peso	6.38	1.02	9.30	237	10.00
Peru Nuevo sol	2.34	(0.95)	13.33	643	7.18
Russian Ruble	3.26	0.25	7.44	91	9.98
Singapore Dollar	2.43	(0.08)	2.88	112	10.00
South African Rand	2.13	1.03	9.08	109	10.00
Turkish Lira	10.24	1.18	15.99	281	0.30
Thailand Baht	0.58	(0.05)	1.46	3	2.00
<b>Total</b>	<b>2.68</b>	<b>0.33</b>	<b>6.69</b>	<b>180</b>	<b>100.00</b>

# Return Attributions

**Table 27: Quarterly return attributions**

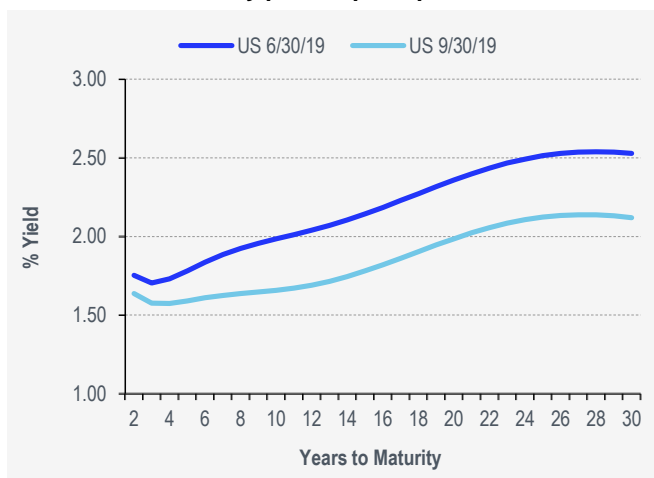
Index	Coupon	Amort/ Roll	Curve Shift	Curve Reshape	Spread Change	MBS Principal Paydown	Volatility Change	Total Return	Excess Return
GBMI	0.61%	-0.21%	1.85%	-0.15%	0.20%	-0.03%	0.00%	2.28%	0.34%
W0G1	0.48%	-0.25%	1.94%	-0.06%	0.37%	0.00%	0.00%	2.47%	0.44%
G0BQ	0.57%	-0.26%	1.70%	-0.17%	0.17%	0.00%	0.00%	2.01%	0.33%
G0BL	0.80%	-0.03%	1.21%	-0.36%	-0.04%	-0.19%	0.05%	1.43%	0.08%
G0BC	0.82%	-0.20%	2.17%	-0.20%	-0.04%	0.00%	-0.01%	2.54%	0.31%
US00	0.79%	-0.10%	1.95%	-0.16%	-0.05%	-0.06%	0.01%	2.38%	0.10%
B0A0	0.75%	-0.14%	2.25%	-0.10%	-0.04%	0.00%	-0.01%	2.72%	0.13%
G0Q0	0.61%	-0.13%	2.15%	-0.11%	-0.01%	0.00%	0.00%	2.51%	0.02%
G0P0	0.76%	-0.26%	1.36%	-0.24%	0.11%	0.00%	0.01%	1.74%	0.16%
C0A0	0.96%	-0.15%	2.48%	-0.06%	-0.14%	0.00%	-0.02%	3.07%	0.22%
C0A1	0.79%	-0.08%	3.58%	0.39%	-0.59%	0.00%	-0.03%	4.05%	-0.32%
C0A2	0.79%	-0.14%	2.41%	-0.01%	-0.04%	0.00%	-0.01%	2.99%	0.17%
C0A3	0.89%	-0.15%	2.49%	-0.06%	-0.23%	0.00%	-0.02%	2.92%	0.07%
C0A4	1.06%	-0.16%	2.45%	-0.08%	-0.08%	0.00%	-0.02%	3.17%	0.37%
M0A0	0.88%	0.03%	1.12%	-0.32%	-0.09%	-0.25%	0.07%	1.44%	0.00%
R0A0	0.73%	-0.05%	0.67%	-0.40%	-0.03%	-0.02%	0.00%	0.91%	0.08%
CMBS	0.86%	-0.08%	1.60%	-0.56%	0.09%	-0.01%	0.00%	1.90%	0.33%
PE00	0.51%	-0.39%	2.56%	-0.21%	0.79%	0.00%	0.00%	3.26%	0.98%
EMU0	0.47%	-0.39%	2.09%	-0.31%	0.97%	0.00%	0.00%	2.82%	1.18%
EG00	0.53%	-0.45%	2.41%	-0.17%	1.45%	0.00%	0.00%	3.77%	1.66%
EQ00	0.33%	-0.32%	2.08%	-0.31%	0.48%	0.00%	0.00%	2.25%	0.63%
EP00	0.15%	-0.18%	1.52%	-0.62%	0.26%	0.00%	0.00%	1.13%	0.39%
ER00	0.45%	-0.31%	1.51%	-0.60%	0.27%	0.00%	0.00%	1.32%	0.56%
ER10	0.39%	-0.31%	2.16%	-0.27%	-0.40%	0.00%	-0.01%	1.56%	-0.16%
ER20	0.39%	-0.37%	1.45%	-0.55%	-0.09%	0.00%	0.00%	0.82%	0.09%
ER30	0.40%	-0.30%	1.57%	-0.57%	0.05%	0.00%	0.00%	1.13%	0.29%
ER40	0.51%	-0.30%	1.47%	-0.64%	0.54%	0.00%	0.00%	1.58%	0.88%
EMUL	0.47%	-0.39%	2.10%	-0.31%	0.98%	0.00%	0.00%	2.84%	1.19%
UK00	0.71%	-0.35%	5.06%	0.33%	-0.08%	0.00%	0.00%	5.67%	-0.01%
G0L0	0.64%	-0.36%	5.74%	0.50%	0.07%	0.00%	0.00%	6.59%	0.03%
UQ00	0.58%	-0.27%	2.84%	-0.17%	0.10%	0.00%	0.00%	3.07%	0.21%
UC00	0.94%	-0.32%	3.78%	-0.01%	-0.53%	0.00%	0.00%	3.86%	-0.15%
UC10	0.81%	-0.43%	3.65%	-0.03%	-0.09%	0.00%	0.00%	3.90%	0.14%
UC20	0.71%	-0.26%	3.93%	0.09%	-0.46%	0.00%	0.00%	4.00%	-0.26%
UC30	0.88%	-0.28%	4.31%	0.13%	-0.77%	0.00%	0.00%	4.27%	-0.42%
UC40	1.06%	-0.34%	3.37%	-0.13%	-0.43%	0.00%	-0.01%	3.52%	0.04%
G0M0	0.43%	-0.51%	2.88%	-0.04%	0.01%	0.00%	0.00%	2.77%	-0.01%
G0W0	0.57%	-0.59%	1.86%	-0.44%	-0.02%	0.00%	0.00%	1.38%	-0.01%
G0S0	0.42%	-0.52%	3.52%	0.50%	-0.16%	0.00%	0.00%	3.76%	0.01%
HA00	1.38%	-0.39%	1.54%	-0.32%	-1.04%	0.00%	-0.05%	1.12%	-0.44%
HW00	1.49%	-0.56%	1.04%	-0.38%	-0.36%	0.00%	-0.08%	1.14%	0.10%
HOA0	1.56%	-0.78%	1.02%	-0.34%	-0.13%	0.00%	-0.11%	1.22%	0.02%
HP00	1.05%	-0.18%	0.95%	-0.52%	0.08%	0.00%	-0.01%	1.36%	1.04%
HE00	1.00%	-0.20%	0.88%	-0.55%	0.17%	0.00%	0.00%	1.30%	1.10%
HL00	1.46%	-0.04%	1.45%	-0.31%	-0.61%	0.00%	-0.04%	1.91%	0.61%
HWP0	1.26%	-0.66%	1.00%	-0.49%	1.10%	0.00%	-0.03%	2.19%	1.55%
HC00	1.44%	-0.15%	0.32%	-0.31%	0.43%	0.00%	0.00%	1.74%	1.35%
HWC0	1.58%	-0.70%	0.85%	-0.36%	0.37%	0.00%	-0.12%	1.62%	0.62%
WSOV	0.58%	-0.22%	1.84%	-0.04%	0.32%	0.00%	0.00%	2.48%	0.37%
IP00	1.34%	-0.09%	2.52%	-0.12%	-3.52%	0.00%	0.00%	0.13%	-2.54%
IGOV	1.43%	-0.08%	2.60%	-0.07%	-3.40%	0.00%	0.00%	0.47%	-2.41%
WSAV	0.48%	-0.25%	1.94%	-0.06%	0.37%	0.00%	0.00%	2.48%	0.45%
WSBV	1.20%	-0.06%	1.28%	0.11%	-0.03%	0.00%	0.00%	2.50%	-0.08%
LOCL	1.62%	0.11%	0.90%	0.14%	-0.10%	0.00%	0.00%	2.68%	0.33%
EMGB	1.22%	-0.12%	2.54%	-0.10%	-2.63%	0.00%	0.00%	0.91%	-1.80%
EMCB	1.20%	-0.19%	1.59%	-0.35%	-0.40%	0.00%	-0.02%	1.83%	0.22%
EMCL	1.26%	-0.19%	1.70%	-0.31%	-0.67%	0.00%	-0.02%	1.77%	-0.04%

ICE Data Indices, LLC

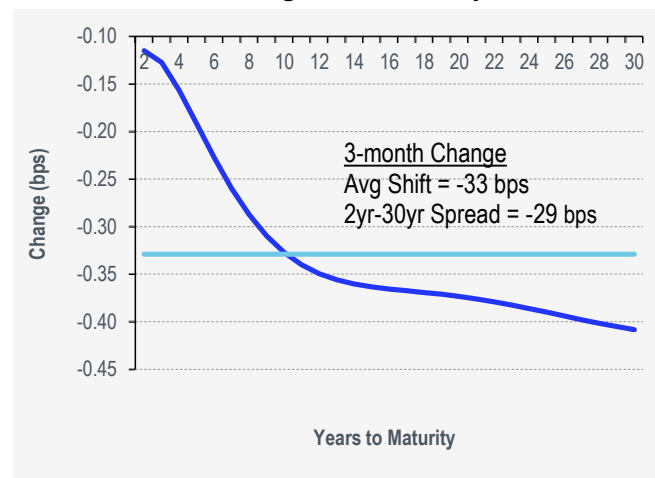
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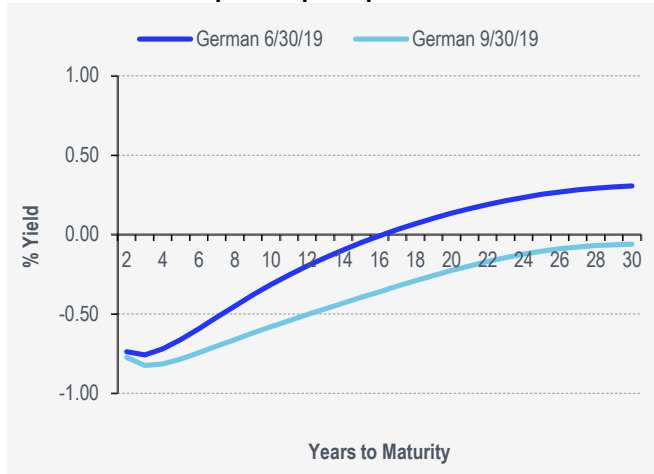
**Chart 58: US Treasury par coupon spline curve**



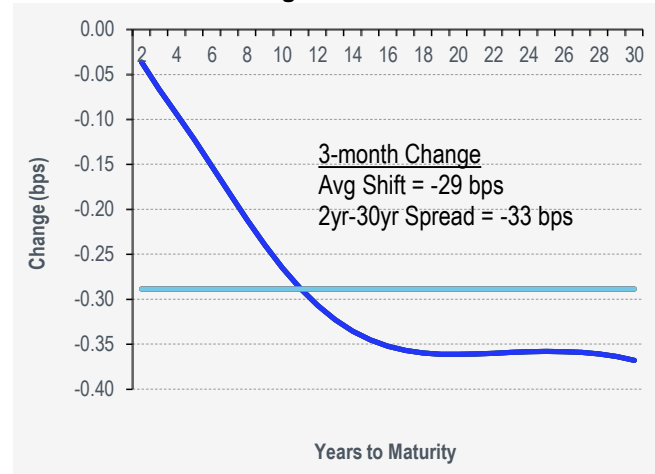
**Chart 61: 3-month change in US Treasury curve**



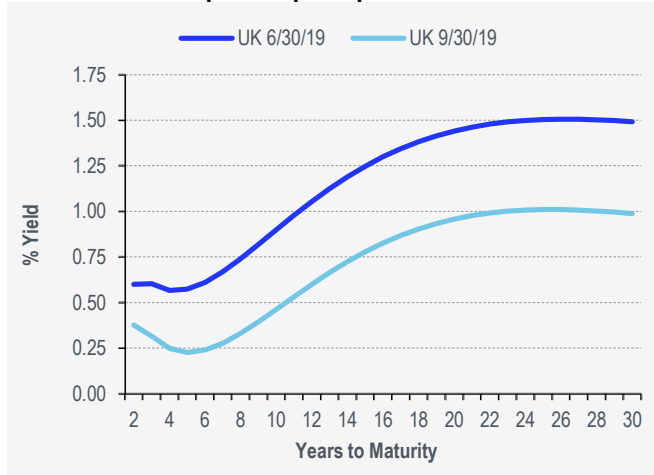
**Chart 59: German par coupon spline curve**



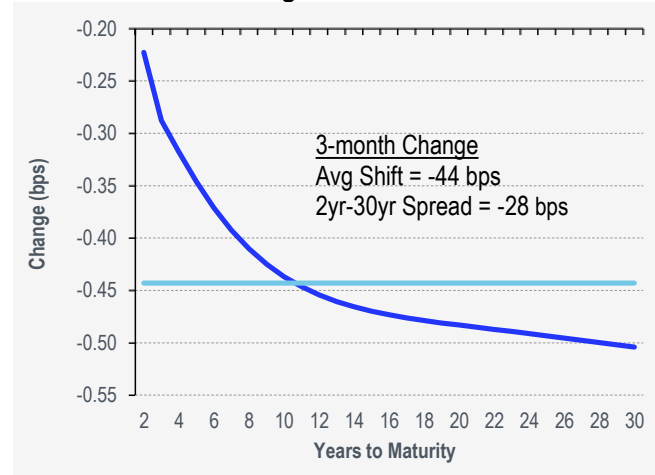
**Chart 62: 3-month change in German curve**



**Chart 60: UK Gilt par coupon spline curve**



**Chart 63: 3-month change in UK Gilt curve**



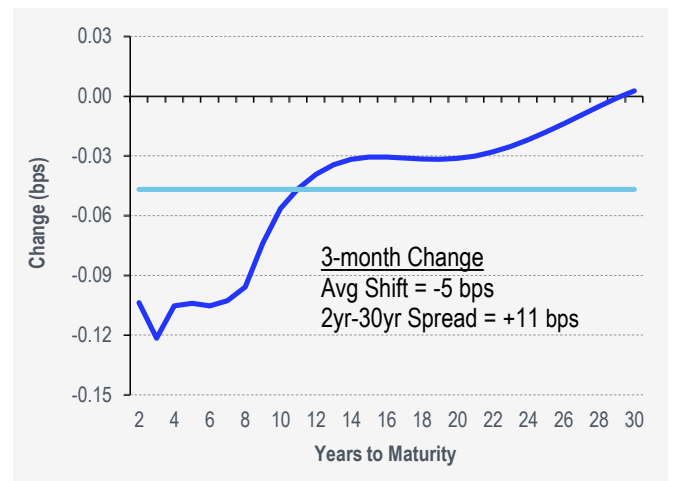
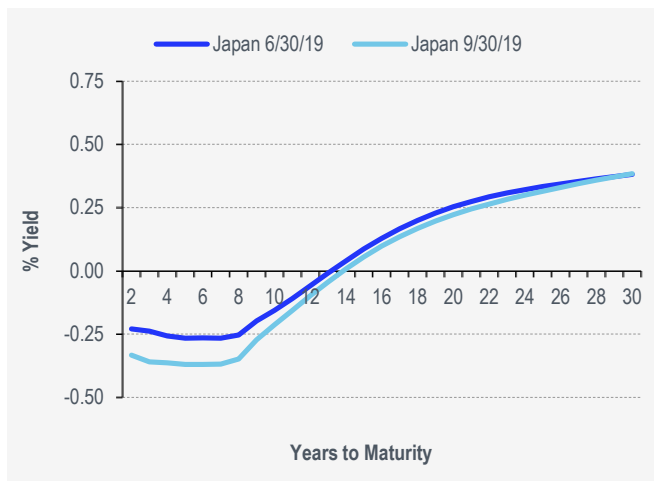
**Chart 64: JGB par coupon spline curve**



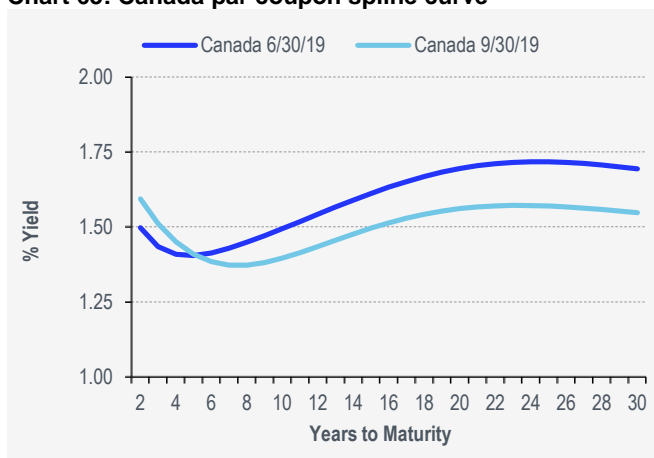
**Chart 66: 3-month change in JGB curve**



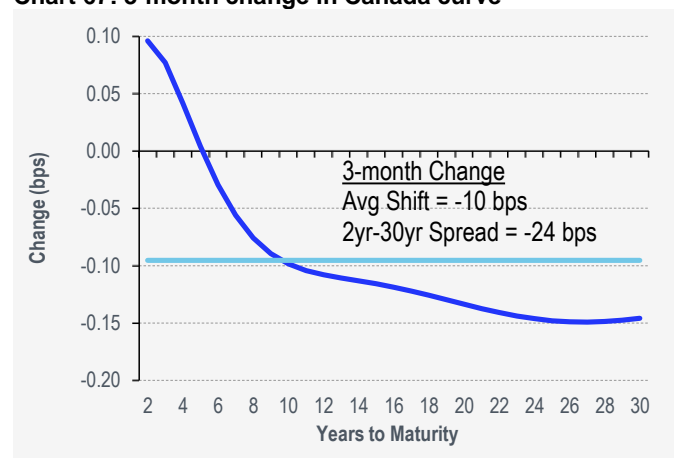




**Chart 65: Canada par coupon spline curve**



**Chart 67: 3-month change in Canada curve**



# Correlation

**Table 28: Last 5 year correlation of monthly total return, local currency terms**

Index	Ticker	GBMI	W0G1	G0BQ	G0BL	G0BC	GBC1	GBC2	GBC3	GBC4	HW00	EMGB	EMCB
Broad IG	GBMI	1.00	0.98	0.98	0.91	0.87	0.95	0.96	0.93	0.76	0.06	0.50	0.36
Global govt	W0G1		1.00	0.96	0.86	0.76	0.90	0.90	0.84	0.63	-0.10	0.38	0.22
Quasi-govt	G0BQ			1.00	0.90	0.85	0.92	0.94	0.91	0.74	0.07	0.48	0.36
Securitized/Collat	G0BL				1.00	0.79	0.87	0.88	0.84	0.68	0.04	0.49	0.38
Corporate	G0BC					1.00	0.90	0.95	0.99	0.98	0.47	0.71	0.64
AAA Corp	GBC1						1.00	0.96	0.95	0.80	0.10	0.51	0.36
AA Corp	GBC2							1.00	0.99	0.87	0.21	0.57	0.45
A Corp	GBC3								1.00	0.93	0.32	0.64	0.53
BBB Corp	GBC4									1.00	0.63	0.78	0.75
High Yield	HW00										1.00	0.70	0.85
EXD EM sov	EMGB											1.00	0.88
EXD EM corp	EMCB												1.00

**Table 29: Last 10 year correlation of monthly total return, local currency terms**

Index	Ticker	GBMI	W0G1	G0BQ	G0BL	G0BC	GBC1	GBC2	GBC3	GBC4	HW00	EMGB	EMCB
Broad IG	GBMI	1.00	0.97	0.98	0.90	0.84	0.93	0.94	0.87	0.73	0.08	0.50	0.37
Global govt	W0G1		1.00	0.95	0.82	0.70	0.89	0.84	0.74	0.56	-0.11	0.35	0.19
Quasi-govt	G0BQ			1.00	0.89	0.83	0.91	0.92	0.85	0.72	0.08	0.50	0.37
Securitized/Collat	G0BL				1.00	0.78	0.82	0.84	0.80	0.70	0.12	0.51	0.43
Corporate	G0BC					1.00	0.82	0.96	0.99	0.98	0.54	0.72	0.71
AAA Corp	GBC1						1.00	0.90	0.84	0.70	0.06	0.45	0.32
AA Corp	GBC2							1.00	0.97	0.88	0.32	0.59	0.54
A Corp	GBC3								1.00	0.95	0.47	0.66	0.65
BBB Corp	GBC4									1.00	0.67	0.77	0.81
High Yield	HW00										1.00	0.68	0.85
EXD EM sov	EMGB											1.00	0.89
EXD EM corp	EMCB												1.00

# Appendix

**Table 30: Return Attribution Methodology**

Return Factor	Description	Calculation Methodology
<b>Coupon</b>	The return attributed to that portion of the nominal coupon earned or received during the period.	Coupons received during the period plus the change in accrued interest divided by the starting price plus accrued interest (also equal to total return minus price return).
<b>MBS Principal Paydown<sup>3</sup></b>	The return of a mortgage security attributed to the receipt of scheduled and unscheduled principal payments at par.	Paydown return equals par minus the starting price divided by the starting price plus accrued interest times the percentage of outstanding principal repaid during the period.
<b>Amortization/Roll</b>	The portion of price return attributed to the passage of time. This includes the amortization of premium bonds and the accretion of discount bonds along with the effect on the present value of a bond's cash flows as they "roll down the yield curve".	Calculate the Option-Adjusted Spread <sup>1</sup> (OAS) of the bond at the beginning of the measurement period. Next change settlement to the end of period date, and using the beginning yield curve, OAS and implied volatility solve for price. The difference between the "Amortization/Roll" price and the beginning price divided by beginning price plus accrued interest is Amortization/Roll return. (Note: for mortgage securities, the prepayment model is used to generate a new set of projected cash flows for the new settlement date, but based on the old yield curve, OAS and volatility assumptions.)
<b>Curve Shift</b>	The impact on a bond's price resulting from general changes in the level of interest rates defined as the average parallel shift in the yield curve <sup>2</sup> .	Price is recalculated using the beginning OAS and implied volatility along with the starting yield curve plus the parallel shift amount. The parallel shift amount is equal to the average change in the 29 points on the par coupon spline curve (from 2 to 30 years). The difference between the "Curve Shift" price and the "Amortization/Roll" price divided by beginning price plus accrued interest is Curve Shift return. (Note: for mortgage securities, the prepayment model is used to generate a new set of projected cash flows based on the old OAS and volatility assumptions and the starting yield curve plus parallel shift amount.)
<b>Curve Reshape</b>	The impact on a bond's price resulting from changes in the shape of the yield curve <sup>2</sup> .	Price is recalculated using the beginning OAS and implied volatility along with the ending yield curve. The difference between the "Curve Reshape" price and the "Curve Shift" price divided by beginning price plus accrued interest is Curve Reshape return. (Note: for mortgage securities, the prepayment model is used to generate a new set of projected cash flows based on the old OAS and volatility assumptions and the ending yield curve.)
<b>Volatility Change</b>	The impact on the price of a security resulting from changes in implied volatility.	Price is recalculated using the beginning OAS along with the ending yield curve and implied volatility. The difference between the "Volatility Change" price and the "Curve Reshape" price divided by beginning price plus accrued interest is Volatility Change return. (Note: For U.S. Mortgages, the prepayment model is used to generate a new set of projected cash flows based on the old OAS, the ending yield curve and new volatility assumptions.)
<b>Spread Change</b>	The change in price resulting from changes in spread.	The difference between the actual ending price and the "Volatility Change" price divided by beginning price plus accrued interest is Spread Change return.
<b>Total Return</b>	The sum of all of the above return factors. (Note: Since the above factors do not take currency into account, the sum of these factors is equal to the local currency return.)	Ending Price plus accrued interest minus beginning price plus accrued interest divided by beginning price plus accrued interest.

<sup>1</sup> Option-adjusted Spread is the number of basis points that the Government curve must be shifted in order to equate a bond's discounted cash flows with its market price.

<sup>2</sup> The French-German curve was used as the baseline government yield curve for purposes of attributing returns for all of the Euro Indices until June 2013. Starting in July 2013 the German curve is used as the benchmark curve for the Eurozone.

<sup>3</sup> MBS Principal Paydown applies only to U.S. Mortgage Backed Securities.

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