

QUARTERLY PERFORMANCE REVIEW

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U.S. BBB Corporate spread is just 14bp off its post financial crisis lows

After starting the year with a spread just over 200bp, The U.S. BBB Corporate Index spread hit a 52 week low of 129bp late in December. There is still a way to go before it matches the all-time spread low of 72bp set in August 1997, but the BBB spread is just 14bp off the lows of the post financial crisis era and it would seem that it is more likely that the index spread could head significantly higher rather than significantly lower. (p 10)

U.S. taxable munis struggle in Q4

An above average duration exposure in a rising rate environment was the primary cause for the taxable muni index's poor showing in Q4, but it was not the sole reason. Adjusted for duration risk, the taxable muni index's 0.48% excess return pales in comparison to high grade Corporates and is less than half that of the tax-exempt muni indices, even before adjusting for taxes. (p 17)

Pan-Europe high grade index has fourth largest loss on record

After three strong quarters, the Pan-Europe Broad Market Index posted its fourth largest loss on record in Q4. But despite the setback the Index still managed to finish 2019 with its best performance in 5 years. (p 22)

Global High Yield Index gains ground for fourth straight quarter

For the seventh time in its 22 year history the Global High Yield Index finished the year with four positive quarterly returns. The 13.95% 2019 return is impressive but we cannot ignore the fact that it comes on the heels of a sizeable loss in 2018 (-2.41). The annualized return for the two years combined is 5.45%, which is not too bad, but it is below the index's annualized return since inception (6.71%). (p 33)

Composite EM index has best year on record

The composite EM index had its best year on record as all EM risk factors pulled the indices in a positive direction for the quarter and year. (p 46)

Global credit markets at a glance

The global bond markets were mixed in Q4 as a rising curve environment took a toll on developed market governments but spread tightening gains in high grade credit markets buffered some of the curve losses. Meanwhile, high yield and Emerging Markets stole the show with impressive gains that contributed to double-digit returns for the year.

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

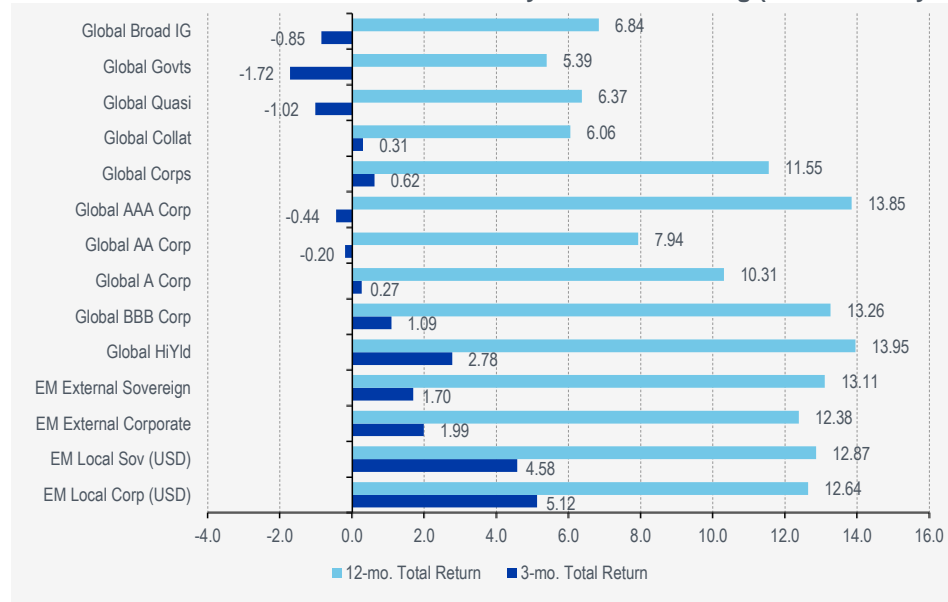
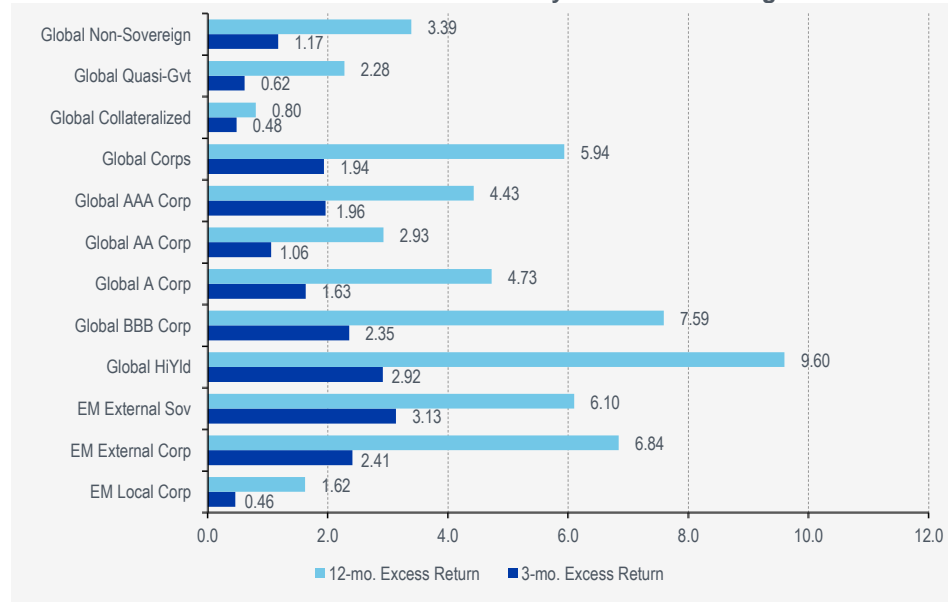


Chart 2: Global Credit Market Excess Returns by Sector and Rating



The 4th quarter saw a strong, across-the-board credit rally that was led by the lower rated tier.

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

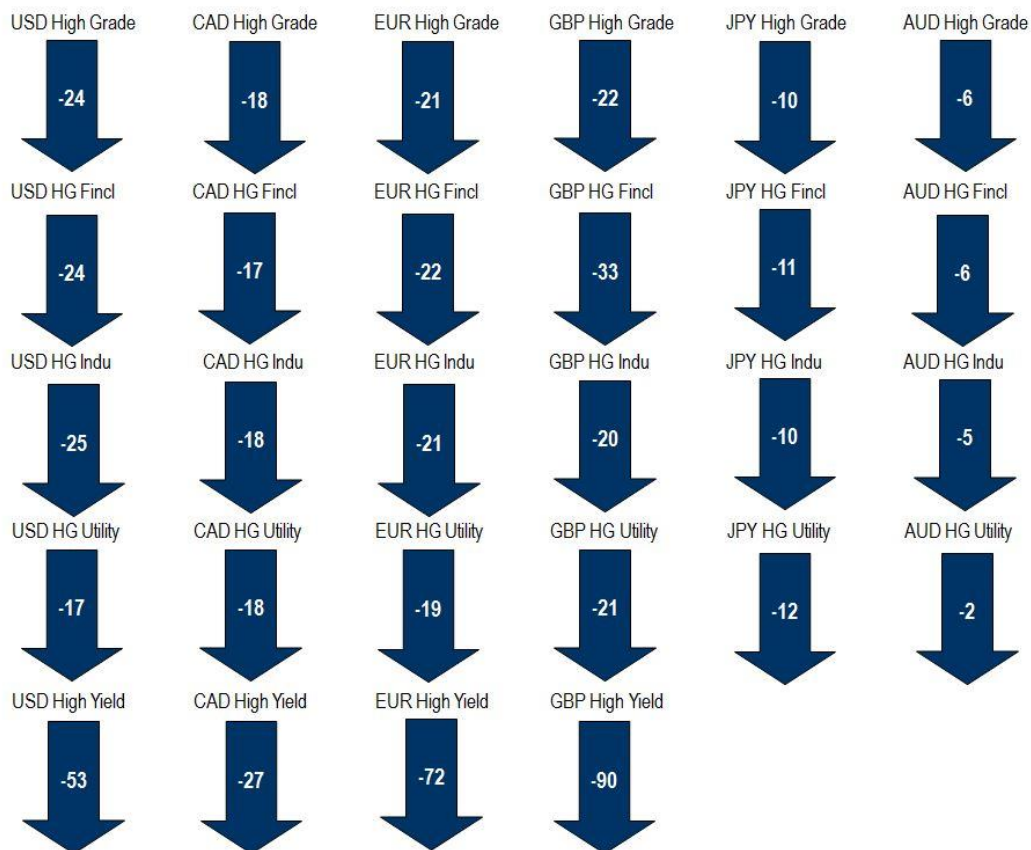


Table 1: Global Spread Recap

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	101	52	53	76	130	360	-21	-13	-9	-18	-26	-42
EUR	94	49	57	78	115	308	-18	-18	-14	-16	-20	-58
GBP	132	65	72	112	169	445	-20	-5	-10	-22	-23	-72
CAD	112	42	54	100	149	347	-14	-7	-15	-14	-12	5
AUD	102	63	71	109	130	n.a.	-1	-2	-2	-2	-2	n.a.
JPY	49	n.a.	38	49	68	n.a.	-9	n.a.	-8	-10	-7	n.a.

The downgrade bias picked up in Q4, with the face value of downgraded debt outpacing that of upgrades by more than a 2:1 margin.

Table 2: Global High Grade Corporate Index Rating Migrations

Quarter	Total	Downgrades		Upgrades		Fallen Angels		Defaults	
	#Issuers	#Issuers	%	#Issuers	%	# Issuers	%	#Issuers	%
Global	2,218	48	2.2	39	1.8	9	0.4	0	0.0
USD	1,189	30	2.5	19	1.6	7	0.6	0	0.0
Pan-Europe	874	17	1.9	22	2.5	0	0.0	0	0.0
EUR	735	15	2.0	20	2.7	0	0.0	0	0.0
GBP	321	8	2.5	2	0.6	0	0.0	0	0.0
JPY	90	3	3.3	1	1.1	0	0.0	0	0.0
CAD	181	5	2.8	3	1.7	1	0.6	0	0.0
AUD	143	4	2.8	2	1.4	0	0.0	0	0.0
	\$ParVal	\$ParVal	%	\$ParVal	%	\$ParVal	%	\$ParVal	%
Global	11,070,876	261,110	2.4	119,467	1.1	13,502	0.1	0	0.0
USD	6,922,234	163,440	2.4	69,451	1.0	12,258	0.2	0	0.0
Pan-Europe	3,181,479	80,939	2.5	39,869	1.3	0	0.0	0	0.0
EUR	2,743,862	67,486	2.5	39,204	1.4	0	0.0	0	0.0
GBP	437,617	13,454	3.1	665	0.2	0	0.0	0	0.0
JPY	150,790	3,412	2.3	292	0.2	0	0.0	0	0.0
CAD	339,266	8,686	2.6	9,201	2.7	944	0.3	0	0.0
AUD	70,297	833	1.2	354	0.5	0	0.0	0	0.0
	# Bonds	# Bonds	%	# Bonds	%	# Bonds	%	# Bonds	%
Global	15,269	348	2.3	181	1.2	22	0.1	0	0.0
USD	8,459	209	2.5	93	1.1	19	0.2	0	0.0
Pan-Europe	4,286	101	2.4	52	1.2	0	0.0	0	0.0
EUR	3,444	78	2.3	50	1.5	0	0.0	0	0.0
GBP	842	23	2.7	2	0.2	0	0.0	0	0.0
JPY	467	7	1.5	1	0.2	0	0.0	0	0.0
CAD	937	18	1.9	32	3.4	2	0.2	0	0.0
AUD	389	7	1.8	2	0.5	0	0.0	0	0.0
Last 12mo	Total	Downgrades		Upgrades		Fallen Angels		Defaults	
	#Issuers	# Issuers	%	# Issuers	%	# Issuers	%	#Issuers	%
Global	2,300	144	6.3	154	6.7	31	1.3	1	0.0
USD	1,225	75	6.1	92	7.5	19	1.6	1	0.1
Pan-Europe	897	63	7.0	74	8.3	6	0.7	0	0.0
EUR	752	53	7.0	69	9.2	6	0.8	0	0.0
GBP	332	27	8.1	16	4.8	2	0.6	0	0.0
JPY	99	11	11.1	1	1.0	0	0.0	0	0.0
CAD	187	14	7.5	10	5.3	3	1.6	0	0.0
AUD	150	7	4.7	6	4.0	0	0.0	0	0.0
	\$ParVal	\$ParVal	%	\$ParVal	%	\$ParVal	%	\$ParVal	%
Global	12,282,489	762,369	6.2	611,025	5.0	52,768	0.4	17,504	0.1
USD	7,633,307	465,487	6.1	407,864	5.3	39,645	0.5	17,504	0.2
Pan-Europe	3,553,338	240,893	6.8	178,499	5.0	7,715	0.2	0	0.0
EUR	3,080,401	203,088	6.6	165,284	5.4	6,505	0.2	0	0.0
GBP	472,937	37,805	8.0	13,215	2.8	1,210	0.3	0	0.0
JPY	176,803	11,582	6.6	290	0.2	0	0.0	0	0.0
CAD	363,787	24,034	6.6	16,973	4.7	1,758	0.5	0	0.0
AUD	86,185	2,414	2.8	1,143	1.3	0	0.0	0	0.0
	# Bonds	# Bonds	%	# Bonds	%	# Bonds	%	# Bonds	%
Global	16,755	991	5.9	857	5.1	78	0.5	29	0.2
USD	9,305	562	6.0	546	5.9	55	0.6	29	0.3
Pan-Europe	4,590	287	6.3	226	4.9	9	0.2	0	0.0
EUR	3,704	223	6.0	201	5.4	7	0.2	0	0.0
GBP	886	64	7.2	25	2.8	2	0.2	0	0.0
JPY	546	34	6.2	1	0.2	0	0.0	0	0.0
CAD	1,021	64	6.3	64	6.3	7	0.7	0	0.0
AUD	452	12	2.7	7	1.5	0	0.0	0	0.0

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

Though not as extreme as with high grade, the high yield index rating migrations were biased towards downgrades in Q4. That is a role reversal from the prior quarter.

Table 3: Global High Yield Corporate Index rating migrations

Quarter	Total	Downgrades		Upgrades		Rising Stars		Defaults	
	# Issuers	# Issuers	%	# Issuers	%	# Issuers	%	# Issuers	%
Global	1,138	84	7.4	51	4.5	12	1.1	5	0.4
USD	863	62	7.2	43	5.0	10	1.2	5	0.6
Pan-Europe	351	22	6.3	10	2.8	3	0.9	0	0.0
EUR	303	19	6.3	9	3.0	3	1.0	0	0.0
GBP	63	3	4.8	1	1.6	0	0.0	0	0.0
CAD	21	1	4.8	1	4.8	0	0.0	0	0.0
	\$ParVal	\$ParVal	%	\$ParVal	%	\$ParVal	%	\$ParVal	%
Global	1,647,123	94,842	5.8	70,671	4.3	26,237	1.6	7,245	0.4
USD	1,263,834	78,038	6.2	62,072	4.9	21,822	1.7	7,245	0.6
Pan-Europe	375,467	16,705	4.4	8,440	2.2	4,415	1.2	0	0.0
EUR	334,819	15,301	4.6	8,071	2.4	4,415	1.3	0	0.0
GBP	40,648	1,405	3.5	370	0.9	0	0.0	0	0.0
CAD	7,822	98	1.3	159	2.0	0	0.0	0	0.0
	# Bonds	# Bonds	%	# Bonds	%	# Bonds	%	# Bonds	%
Global	2,570	162	6.3	102	4.0	34	1.3	11	0.4
USD	1,879	124	6.6	88	4.7	28	1.5	11	0.6
Pan-Europe	656	37	5.6	13	2.0	6	0.9	0	0.0
EUR	557	33	5.9	12	2.2	6	1.1	0	0.0
GBP	99	4	4.0	1	1.0	0	0.0	0	0.0
CAD	35	1	2.9	1	2.9	0	0.0	0	0.0
Last 12mo	Total	Downgrades		Upgrades		Rising Stars		Defaults	
	# Issuers	# Issuers	%	# Issuers	%	# Issuers	%	# Issuers	%
Global	1,248	207	16.6	154	12.3	32	2.6	20	1.6
USD	941	162	17.2	122	13.0	25	2.7	16	1.7
Pan-Europe	391	52	13.3	40	10.2	10	2.6	4	1.0
EUR	336	41	12.2	38	11.3	10	3.0	3	0.9
GBP	74	12	16.2	3	4.1	1	1.4	1	1.4
CAD	23	3	13.0	5	21.7	2	8.7	0	0.0
	\$ParVal	\$ParVal	%	\$ParVal	%	\$ParVal	%	\$ParVal	%
Global	1,968,157	254,229	12.9	243,466	12.4	79,965	4.1	28,237	1.4
USD	1,495,481	211,855	14.2	197,991	13.2	58,537	3.9	25,066	1.7
Pan-Europe	462,775	41,949	9.1	42,264	9.1	19,524	4.2	3,171	0.7
EUR	411,623	34,551	8.4	40,174	9.8	18,153	4.4	2,054	0.5
GBP	51,152	7,398	14.5	2,090	4.1	1,371	2.7	1,117	2.2
CAD	9,901	425	4.3	3,211	32.4	1,904	19.2	0	0.0
	# Bonds	# Bonds	%	# Bonds	%	# Bonds	%	# Bonds	%
Global	3,026	431	14.2	343	11.3	101	3.3	50	1.7
USD	2,217	348	15.7	267	12.0	71	3.2	44	2.0
Pan-Europe	770	80	10.4	68	8.8	27	3.5	6	0.8
EUR	647	63	9.7	63	9.7	24	3.7	4	0.6
GBP	123	17	13.8	5	4.1	3	2.4	2	1.6
CAD	39	3	7.7	8	20.5	3	7.7	0	0.0

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

The volume of fallen angels rose in Q4 and it was enough to put 2019's total beyond that of the prior year (\$41bn vs \$32bn).

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

	USD	EUR	GBP	CAD	Global
2016	143,997	20,281	494	-	164,772
Jan	1,950	-	-	-	1,950
Feb	7,800	535	-	-	8,335
Mar	-	-	-	-	-
Q1 2017	9,750	535	-	-	10,285
Apr	1,200	-	-	-	1,200
May	1,000	2,566	-	-	3,566
Jun	3,927	2,965	-	-	6,892
Q2 2017	6,127	5,531	-	-	11,658
Jul	1,000	1,182	-	-	2,182
Aug	1,100	-	-	-	1,100
Sep	-	-	-	-	-
Q3 2017	2,100	1,182	-	-	3,282
Oct	4,580	2,402	-	-	6,982
Nov	22,346	8,406	-	-	30,752
Dec	1,750	961	566	-	3,277
Q4 2017	28,676	11,769	566	-	41,011
2017	46,653	19,394	566	-	66,613
Jan	625	-	-	-	625
Feb	2,175	-	-	-	2,175
Mar	5,700	615	-	-	6,315
Q1 2018	8,500	615	-	-	9,115
Apr	1,400	759	209	-	2,368
May	5,000	1,518	561	-	7,079
Jun	2,350	-	-	-	2,350
Q2 2018	8,750	-	-	-	11,797
Jul	4,600	-	-	-	4,600
Aug	950	581	-	-	1,531
Sep	350	-	-	-	350
Q3 2018	5,900	581	-	-	6,481
Oct	1,500	686	1,401	-	3,587
Nov	1,000	-	-	-	1,000
Dec	7,337	-	-	-	7,337
Q4 2018	9,837	686	1,401	-	11,924
2018	27,987	2,573	1,602	-	32,162
Jan	10,741	-	-	-	10,741
Feb	1,340	-	-	-	1,340
Mar	1,400	-	-	-	1,400
Q1 2019	13,481	-	-	-	13,481
Apr	850	1,196	573	-	2,619
May	1,350	-	-	-	1,350
Jun	1,638	2,449	-	-	4,087
Q2 2019	3,838	3,645	573	-	8,056
Jul	-	-	-	-	-
Aug	3,900	2,784	612	-	7,296
Sep	-	-	-	-	-
Q3 2019	3,900	2,784	612	-	7,296
Oct	3,150	-	-	-	3,150
Nov	8,468	-	-	-	8,468
Dec	940	-	-	-	940
Q4 2019	12,558	-	-	-	12,558
2019	33,777	6,359	1,198	-	41,334

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

Defaults remained relatively contained, decreasing to \$7bn from \$11bn in the prior quarter. While that is true, 2019's total defaulted face amount (\$28bn) was a three-year high.

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

	USD	EUR	GBP	CAD	Global
2016	39,365	6,189	-	130	45,684
Jan	5,061	-	-	-	5,061
Feb	382	-	-	-	382
Mar	-	-	-	-	-
Q1 2017	5,443	-	-	-	5,443
Apr	-	-	-	-	-
May	1,393	-	-	-	1,393
Jun	1,830	-	-	-	1,830
Q2 2017	3,223	-	-	-	3,223
Jul	-	1,212	-	-	1,212
Aug	-	-	-	-	-
Sep	1,117	-	-	-	1,117
Q3 2017	1,117	1,212	-	-	2,329
Oct	500	-	-	-	500
Nov	2,040	-	-	-	2,040
Dec	1,149	-	-	-	1,149
Q4 2017	3,689	-	-	-	3,689
2017	13,472	1,231	-	-	14,703
Jan	1,390	357	982	-	2,729
Feb	2,997	-	233	-	3,230
Mar	8,748	-	-	-	8,748
Q1 2018	13,135	357	1,215	-	14,707
Apr	1,671	-	-	-	1,671
May	-	-	-	-	-
Jun	-	-	-	-	-
Q2 2018	1,671	-	-	-	1,671
Jul	-	-	-	-	-
Aug	-	-	-	-	-
Sep	-	-	-	-	-
Q3 2018	-	-	-	-	-
43,385	1,811	-	-	-	1,811
43,416	525	-	-	-	525
43,446	1,460	657	-	-	2,117
Q4 2018	3,796	657	-	-	4,453
2,018	18,602	988	1,102	-	20,692
Jan	-	-	-	-	-
Feb	2,616	-	-	-	2,616
Mar	-	-	-	-	-
Q1 2019	2,616	-	-	-	2,616
Apr	3,858	-	-	-	3,858
May	1,467	456	-	-	1,923
Jun	300	-	1,102	-	1,402
Q2 2019	5,625	456	1,102	-	7,183
Jul	6,151	285	-	-	6,436
Aug	2,874	-	-	-	2,874
Sep	500	1,266	-	-	1,766
Q3 2019	9,525	1,551	-	-	11,076
Oct	5,495	-	-	-	5,495
Nov	1,500	-	-	-	1,500
Dec	250	-	-	-	250
Q4 2019	7,245	-	-	-	7,245
2019	25,011	1,999	1,091	-	28,101

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

US High Grade

After scoring big returns in the four prior quarters, the US Broad Market Index barely broke even in Q4.

After riding high with four straight quarterly returns in excess of 1.5%, the US Broad Market Index slumped in Q4 2019 as it barely managed to keep its head above water with a 0.11% return. Actually, the slowdown in the U.S. high grade bond markets began in Q3 when the index lost 0.59% in September. That was its first monthly loss of the year of more than a basis point and it came right on the heels of a 2.72% gain in August. So at the time it was not too much cause for concern. But the index has since gone on to post losses in three of the last four months and the one monthly gain in October (+0.27%) was modest to say the least. As a result, the index is down nearly half a percent for the last four months of the year. That certainly does not take the shine off 2019's performance (8.88% FY return), which is easily its best in 17 years. But it does raise questions about where we are headed next.

Despite the late year slump, the ex-Treasuries portion of the index managed to break into double-digit territory for the year.

At the end of Q3, with a 8.76% YTD return in hand, it looked as though the US Broad Market Index was within reach of its first double-digit full year return since 2002. Of course, with a roughly break-even return over the last quarter that never materialized. However, the ex-Treasuries portion of the index did managed to break the 10% mark (10.08%) as it delivered its best return since 2000. Corporates did even better than the broad credit index, posting a 14.23% return for the year, though that did not come close to matching the Corporate Index's 19+% return in 2009.

Just as it was all year long, the dominant performance factor in Q4 was the curve. But this time the curve drove the index in the opposite direction. Q4 Curve losses of 1.15% were almost twice as large as offsetting spread tightening gains (0.66%) as rising rates cost the index in each of the three months. For the year the opposite was true – curve gains of 4.54% accounted for more than half of the index's 8.88% return on the year, while spread gains accounted for only an eighth of the bottom line (1.14%).

Exhibit A: US Broad Market Index MTD return attribution

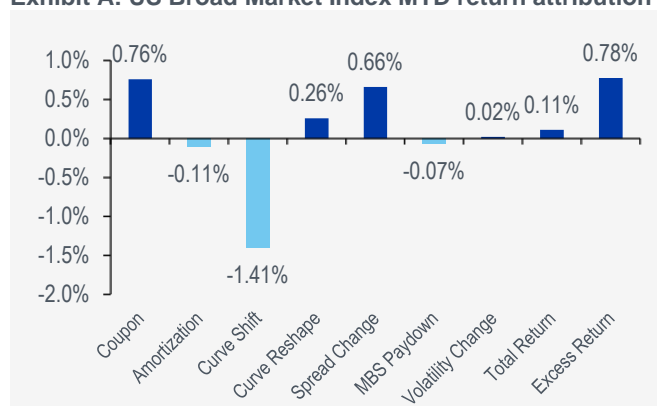
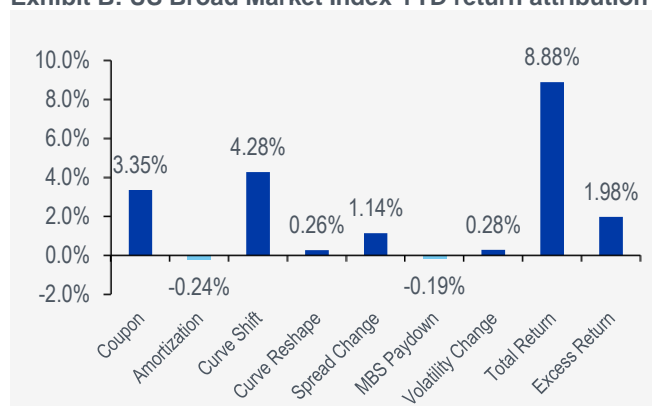


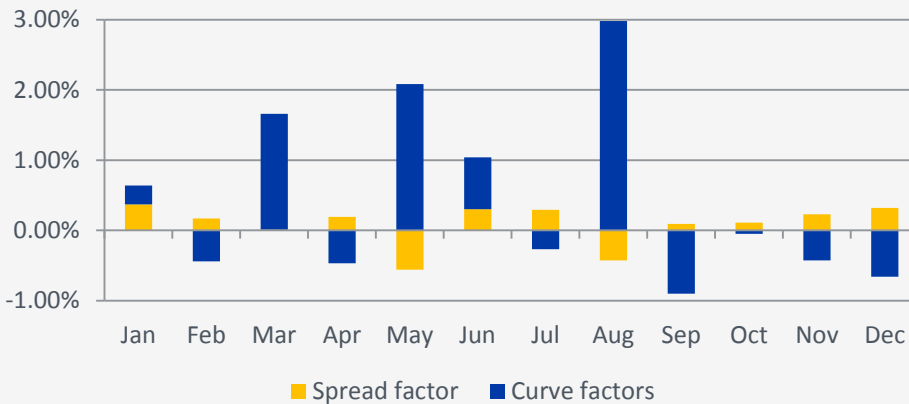
Exhibit B: US Broad Market Index YTD return attribution



Curve losses more than offset spread gains throughout the quarter.

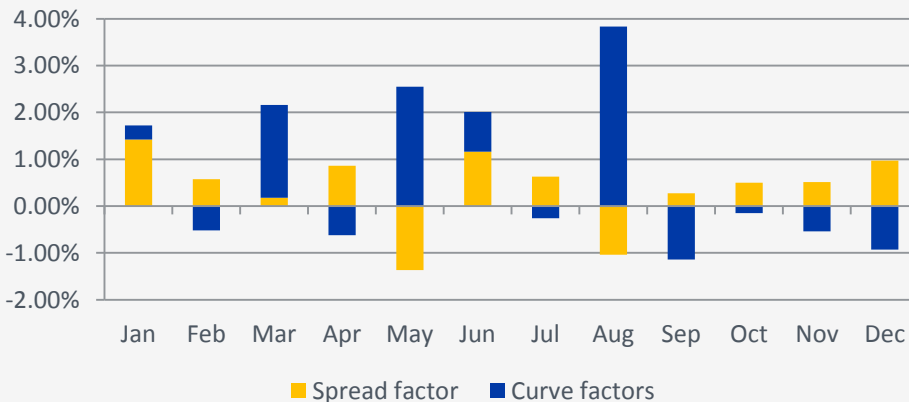
The curve may have made the largest positive contribution to the index's full year performance, but Q4 was not the only time it produced headwinds. In fact, December was the fourth straight month of curve losses and the fifth in the last six months. The first half was not a cake walk either – the index incurred curve losses in two of the first six months of the year as well. So overall, in 2019 the curve generated losses in seven months and gains in only five months. On the other hand, the spread factor was positive in ten of 12 months, including the entire fourth quarter. But when they are all added up, the proliferation of winning months from a spread perspective were just a fraction of the curve gains that were amassed in March, May and August.

Exhibit C: US Broad Market Index 2019 FY spread and curve factor returns



The muted impact of spread performance on the US Broad Market Index is not too much of a surprise given the fact that 70% of the index is comprised of Government and Government related sectors. Over the course of the year, the Corporate Index had the same ratio of winning and losing months from a spread and curve perspective (ten positive and two negative spread returns) but it produced a full year spread return that was four times that of the Broad Market Index (4.54% vs. 1.14%). Like the Broad Market Index it also had five positive and seven negative curve returns during the year. But with 25% more duration exposure than the Broad Index, the Corporate Index also outperformed its larger peer in terms of its full year curve performance (5.50% vs. 4.91%).

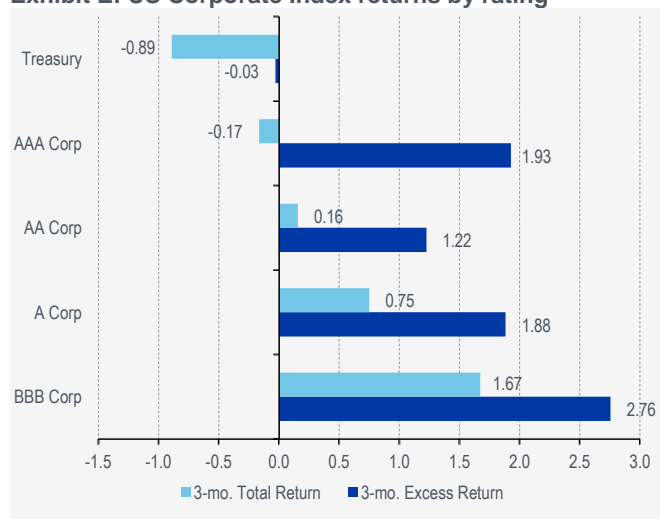
Exhibit D: US Corporate Index 2019 FY spread and curve factor returns



Lower rated credits did best in Q4 as the BBB Index posted its best excess return in over 7 years.

The U.S. corporate bond market clearly took full advantage of the rising curve environment, but nothing more. With the curve shifting an average of 23bp higher on the quarter, the average spread of the US Corporate Index tightened 21bp. Nonetheless, this was not a case of all Corporate yields standing still while the yield curve shifted around them. Disregarding the AAA category, which represents less than 2% of the Index, spread tightening increased steadily with each step down in rating: AAs -9bp, As -18bp, BBBs -26bp. For the BBB Corporate Index, that translated into an impressive 2.76% excess return for the quarter – its second best in over 7 years. The best BBB excess return over that period also came in 2019, so all in all this was a good year for the index, ranking as the fourth best excess return in its 23 year history. Should we expect a letdown in 2020? Not necessarily – in the three other years in which the BBB Index posted a better than 8% excess return it posted very solid results the next year as well (3.31% in 2013, 4.02% in 2010 and 2.28% in 2004).

Exhibit E: US Corporate Index returns by rating



The BBB spread is just 14bp off its post financial crisis lows.

After starting the year with a spread just over 200bp, The BBB Corporate Index spread hit a 52 week low of 129bp late in December. There is still a way to go before it matches the all-time spread low of 72bp set in August 1997. But it is just 14bp off the lows of the post financial crisis era and it would seem that it is more likely that the index spread could head significantly higher rather than significantly lower. The mean spread over the index's full history is 199bp, or roughly in line with where the index began 2019. And the average spread over the last 10 years is in that same vicinity (192bp). So a spread somewhere around 200bp might be a reasonable expectation.

The Q4 upgrade/downgrade ratio was the worst the index has seen in 2 years.

2019 was a good year for the Corporate Index from a spread performance perspective, but it was not so good in terms of rating migrations. In Q4 the index saw the volume of constituent downgrades exceed upgrades for a third straight quarter and the fourth time in the last five quarters. Q4 2019 was the worst of the lot with downgrades outweighing upgrades by more than a 2:1 ratio (\$163bn vs. \$69bn). The 0.425 Q4 2019 upgrade/downgrade ratio was the worst the index has seen since Q4 2017 and it drove the 12-month upgrade/downgrade ratio (0.876) to its lowest reading since May 2018.

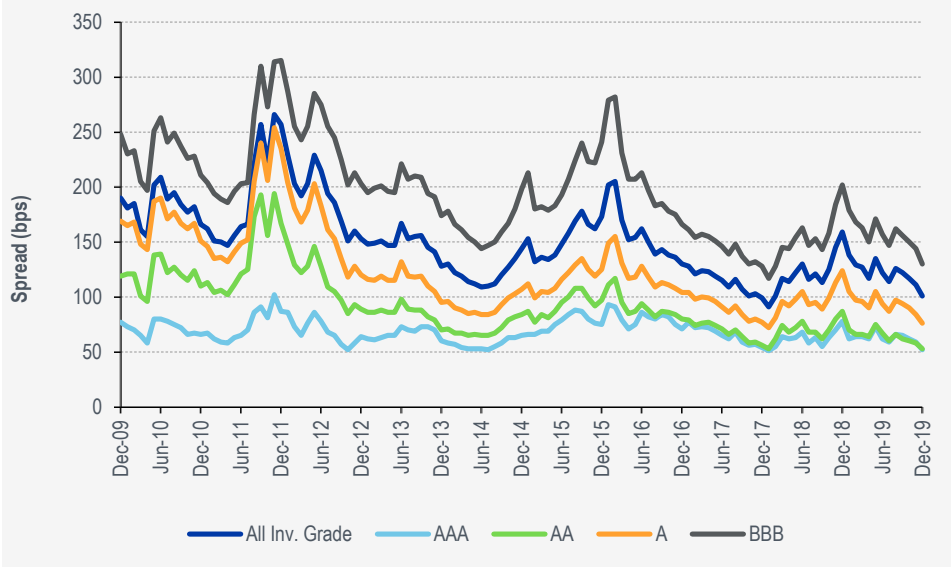
Exhibit F: US spread & excess return by sector

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	26.4	7.65	101	-21	-58	0.4	1.1	0.7	2.26	6.49	2.30	1.99	1.95	0.26	0.18	0.18
Banking	5.8	5.17	80	-21	-67	0.2	1.0	0.5	1.79	5.79	2.23	1.98	2.35	0.32	0.25	0.20
Financial Services	2.5	5.95	98	-23	-67	0.3	1.0	0.6	1.87	5.42	2.55	2.29	2.69	0.42	0.32	0.26
Insurance	4.0	8.71	114	-20	-50	0.4	1.1	0.7	2.51	6.98	2.78	2.33	3.15	0.32	0.23	0.24
Automotive	2.6	4.18	110	-24	-68	0.5	1.6	0.9	1.71	5.13	1.48	1.36	1.88	0.20	0.16	0.25
Basic Industry	4.5	7.90	142	-23	-58	0.4	1.3	0.7	2.66	7.22	3.10	2.31	1.79	0.28	0.12	0.12
Capital Goods	4.5	7.82	85	-18	-59	0.5	1.1	0.8	1.92	6.17	1.37	1.37	1.42	0.16	0.15	0.18
Consumer Goods	6.1	8.31	99	-20	-56	0.6	1.3	0.9	2.36	7.55	1.76	1.78	1.69	0.18	0.19	0.20
Energy	11.4	7.98	142	-26	-59	0.4	1.2	0.8	2.66	7.11	2.66	2.23	1.62	0.24	0.09	0.10
Healthcare	9.4	8.98	88	-22	-44	0.6	1.1	0.8	2.73	6.15	2.18	1.89	1.54	0.24	0.20	0.18
Leisure	0.4	4.90	120	-22	-87	0.4	1.2	0.7	1.80	7.08	2.55	2.26	2.97	0.35	0.31	0.39
Media	3.3	9.46	111	-26	-67	0.5	1.0	0.7	3.27	8.87	3.06	2.41	2.18	0.23	0.16	0.15
Real Estate	2.6	6.35	100	-19	-56	0.3	1.0	0.6	1.73	5.43	2.57	2.27	3.15	0.44	0.35	0.32
Retail	3.1	8.94	82	-17	-59	0.5	1.0	0.7	2.09	6.39	1.86	1.81	1.50	0.20	0.17	0.15
Services	1.1	10.08	97	-9	-41	0.5	1.0	0.7	1.08	4.61	2.20	2.10	1.93	0.39	0.33	0.26
Technology & Electronics	7.5	7.70	75	-19	-51	0.5	1.0	0.7	2.05	5.90	2.13	1.99	1.56	0.25	0.22	0.18
Telecommunications	4.3	9.52	113	-29	-77	0.4	1.0	0.7	3.50	10.90	3.98	3.17	2.27	0.27	0.19	0.15
Transportation	2.4	9.91	110	-20	-42	0.5	1.2	0.7	2.54	6.03	1.93	1.96	2.07	0.19	0.16	0.20
Utility	8.3	9.92	109	-16	-50	0.6	1.1	0.8	2.03	5.35	1.73	1.56	1.55	0.19	0.16	0.16
Foreign Govt. and Supras	4.6	5.66	55	-8	-25	0.3	1.0	0.6	1.11	3.43	1.66	1.11	1.03	0.33	0.17	0.15
US Agencies	1.1	4.27	12	1	-4	0.3	1.7	0.6	0.11	0.47	0.47	0.38	0.41	0.47	0.46	0.32
Taxable Munis	0.7	11.02	113	-3	-18	0.5	1.1	0.7	0.63	3.45	2.57	2.22	na	0.37	0.25	na
MBS	23.2	3.54	42	-13	-3	0.6	-2.2	1.3	0.56	0.48	0.19	0.16	0.53	0.06	0.05	0.11
ABS	1.4	2.10	78	5	2	0.4	1.5	0.9	0.04	0.48	0.79	0.83	1.14	0.67	0.62	0.65
CMBS	1.8	4.89	91	7	-10	0.2	1.2	0.6	0.03	1.75	1.19	1.24	3.04	0.37	0.32	0.38

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

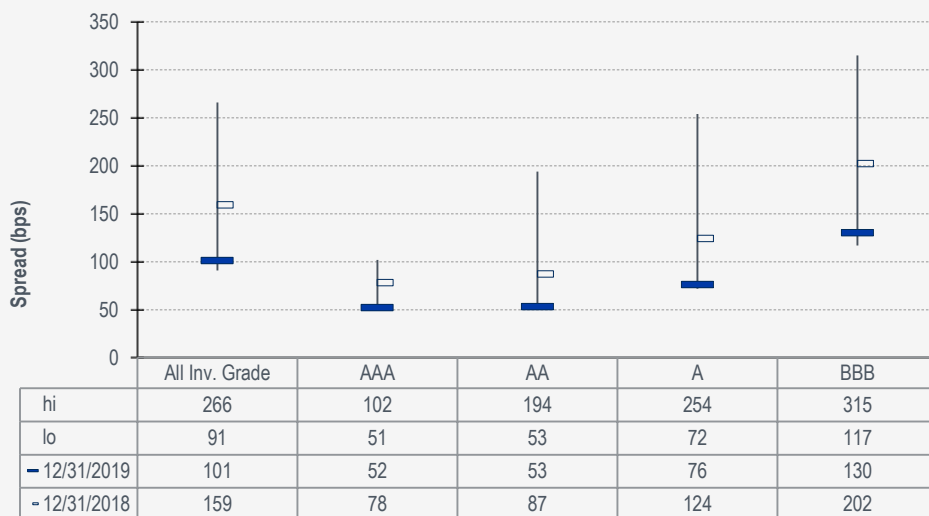
Spreads continued their downward trend in Q4 as all rating categories roughly reversed their respective 2018 sell-offs.

Chart 4: US Corporate Index spread by rating



AAA-A spreads are at, or within basis points of their respective 10 year lows. BBBs are not that much farther away from the bottom of their range over the decade (+13bp), having narrowed by more than a third on the year.

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



10 year spreads in each rating category are 25% to 30% below their respective averages over the last decade.

Chart 6: 10 year maturity USD corporate spreads

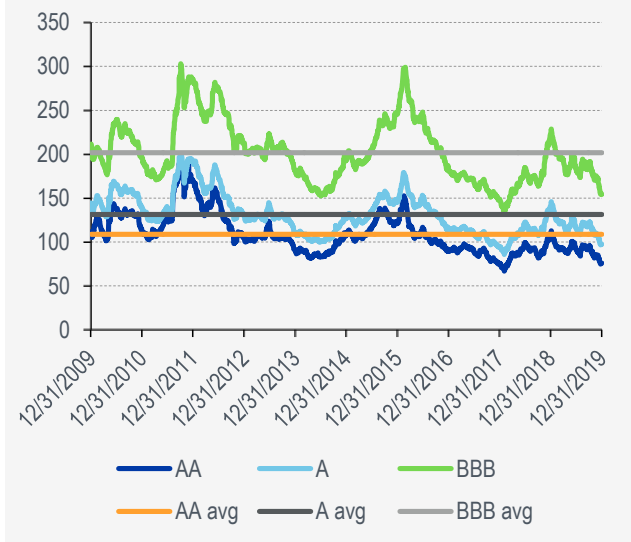
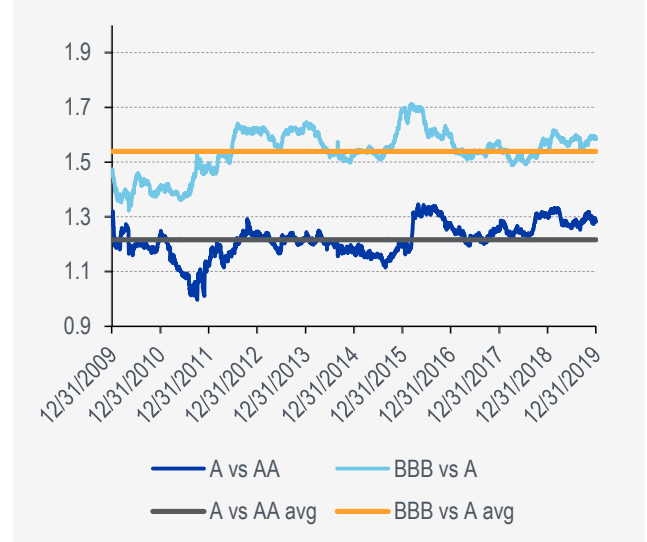


Chart 7: 10 year maturity USD corporate spread multiples



5-year Sharpe ratios moved lower on the quarter as the curve sell-off took its toll on all investment grade sectors. On the other hand, 10-year Sharpe ratios are almost unchanged across the board versus the end of Q3.

Table 5: US 5- and 10-Year Sharpe ratios (as of 31 Dec 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	1.07	0.58	0.26	0.23				
US Broad Market	US00	3.10	3.83	3.14	2.95	0.19	0.32	-0.04	0.00
Corp/Govt Master	B0A0	3.28	4.03	3.59	3.39	0.18	0.29	-0.04	0.00
US Treasury	G0Q0	2.41	3.21	3.90	3.70	0.10	0.21	-0.05	0.01
1-3 Yr	G1O2	1.39	1.22	0.93	0.80	0.10	0.23	-0.01	0.02
3-5 Yr	G2O2	2.10	2.50	2.36	2.36	0.13	0.24	-0.03	0.01
5-7 Yr	G3O2	2.62	3.56	3.69	3.85	0.12	0.22	-0.04	0.01
7-10 Yr	G4O2	2.85	4.42	5.11	5.36	0.11	0.21	-0.05	0.01
10+ Yr	G9O2	4.05	6.87	10.81	10.93	0.09	0.18	-0.07	0.00
1-5 Yr	GVQ0	1.68	1.73	1.50	1.41	0.12	0.23	-0.02	0.01
5-10 Yr	G6O2	2.72	3.95	4.25	4.48	0.12	0.22	-0.05	0.01
1-10 Yr	G5O2	2.00	2.48	2.31	2.37	0.12	0.23	-0.04	0.01
US Agency	G0P0	2.36	2.62	2.30	2.11	0.16	0.28	-0.05	0.00
1-3 Yr	G1P0	1.51	1.33	0.82	0.70	0.15	0.31	-0.01	0.02
3-5 Yr	G2P0	2.16	2.52	2.00	1.97	0.16	0.28	-0.03	0.01
5-7 Yr	G3P0	2.92	3.78	3.11	3.29	0.17	0.28	-0.04	0.00
7-10 Yr	G4P0	3.77	4.94	4.64	4.49	0.17	0.28	-0.05	0.00
10+ Yr	G9P0	4.43	6.62	7.01	7.45	0.14	0.24	-0.06	0.01
1-5 Yr	GVP0	1.68	1.66	1.10	1.03	0.16	0.30	-0.02	0.01
5-10 Yr	G6P0	3.26	4.23	3.79	3.78	0.17	0.28	-0.05	0.00
1-10 Yr	G5P0	1.88	2.05	1.40	1.40	0.17	0.30	-0.03	0.01
Inv. Grade Corp	C0A0	4.60	5.60	3.90	3.95	0.26	0.36	-0.01	0.00
1-3 Yr	C1A0	2.46	2.63	0.94	1.10	0.42	0.53	0.04	-0.01
3-5 Yr	C2A0	3.55	4.26	2.11	2.53	0.34	0.41	0.01	0.00
5-7 Yr	C3A0	4.71	5.82	3.19	3.61	0.33	0.41	0.01	0.00
7-10 Yr	C4A0	5.03	6.27	4.21	4.57	0.27	0.36	-0.01	0.00
10+ Yr	C9A0	6.38	8.10	7.59	7.58	0.21	0.29	-0.02	0.01
1-5 Yr	CVA0	2.98	3.44	1.49	1.79	0.36	0.45	0.02	-0.01
5-10 Yr	C6A0	4.88	6.07	3.76	4.15	0.29	0.38	0.00	0.00
1-10 Yr	C5A0	3.81	4.66	2.47	2.84	0.32	0.41	0.00	0.00
AAA	C0A1	4.60	4.85	5.37	4.67	0.19	0.26	-0.04	0.01
AA	C0A2	3.88	4.55	3.61	3.56	0.22	0.32	-0.04	0.00
A	C0A3	4.24	5.26	3.80	3.88	0.24	0.34	-0.02	0.00
BBB	C0A4	5.05	6.24	4.20	4.28	0.27	0.38	0.01	0.00
Banking	C0P0	4.18	5.27	2.73	3.62	0.33	0.37	-0.01	-0.01
Financial Services	CFFS	4.67	5.86	2.91	3.30	0.35	0.45	-0.02	-0.01
Insurance	CFIE	5.13	6.97	4.09	4.29	0.28	0.42	-0.02	-0.02
All Financials	CF00	4.36	5.58	2.92	3.61	0.32	0.39	-0.01	-0.01
Automotive	CIAU	3.40	4.49	2.70	2.68	0.25	0.41	0.00	-0.01
Basic Industry	CIBS	4.98	5.56	5.18	4.93	0.22	0.29	0.01	-0.01
Capital Goods	CICP	4.03	5.11	3.97	3.90	0.22	0.33	-0.03	0.01
Consumer Goods	CICS	4.46	5.35	4.16	4.07	0.22	0.33	-0.02	0.01
Energy	CIEN	4.89	5.57	5.48	5.18	0.20	0.28	0.03	0.00
Healthcare	CHCR	4.67	5.54	4.60	4.52	0.23	0.31	-0.02	0.02
Leisure	CILE	4.51	5.92	2.92	3.10	0.33	0.48	0.01	0.01
Media	CIME	5.30	6.39	5.30	5.23	0.23	0.32	-0.01	0.00
Real Estate	CIRE	4.72	6.46	3.35	3.88	0.31	0.43	-0.02	-0.01
Retail	CIRL	4.67	5.72	4.79	4.74	0.20	0.30	-0.03	0.00
Services	CISE	5.00	6.20	4.94	4.74	0.23	0.34	-0.04	0.00
Tech & Electronics	CITE	4.61	5.07	3.83	3.70	0.27	0.35	-0.02	0.01
Telecommunications	C0R0	6.13	6.40	5.26	5.02	0.28	0.33	-0.01	0.01
Transportation	C0W0	4.95	6.29	5.14	4.82	0.22	0.34	-0.03	0.01
All Industrials	CI00	4.71	5.59	4.29	4.25	0.24	0.34	-0.01	0.00
Utility	C0Q0	4.53	5.94	5.06	4.89	0.20	0.31	-0.03	0.01
Mortgages	M0A0	2.60	3.18	2.13	2.15	0.21	0.35	-0.04	0.01
FN&FH 30 Yr	MF30	2.83	3.39	2.26	2.24	0.22	0.36	-0.04	0.01
GN 30 Yr	MG1S	2.36	3.24	1.99	2.29	0.19	0.33	-0.05	0.01
All 15 Yr	M15A	2.18	2.56	1.94	1.85	0.17	0.31	-0.03	0.02
CMBS Fixed Rate	CMBS	3.37	5.42	2.70	2.99	0.24	0.46	-0.04	-0.02
Fixed Rate ABS	R0A0	2.34	2.56	0.93	1.00	0.39	0.56	-0.03	0.00

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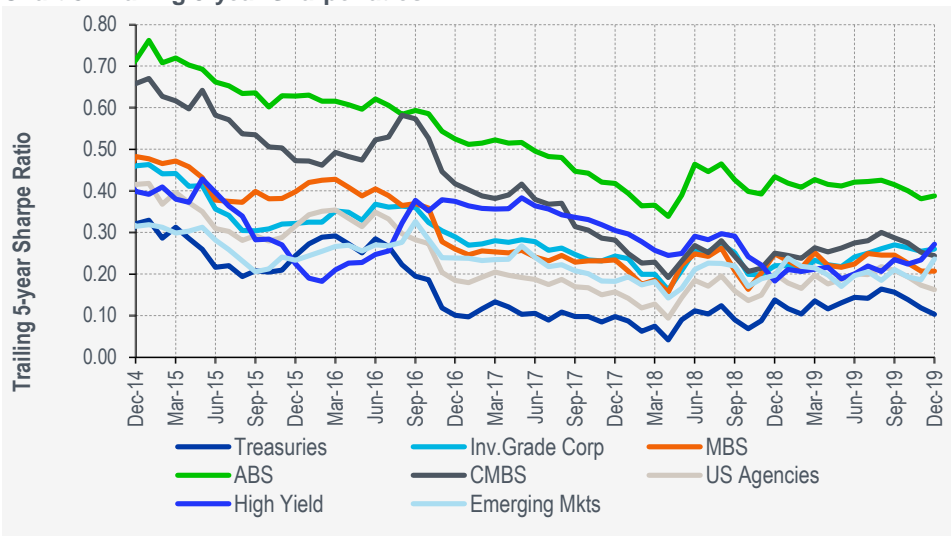
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Reverse highlighted values are the top ranked sectors; shaded values are the bottom ranked sectors.

With the exception of high yield and emerging markets, 5-year Sharpe ratios slipped a little lower during Q4. The Q4 improvement lifted high yield three notches higher in the rankings as it moved ahead of MBS, investment grade Corporates and CMBS. Meanwhile, ABS remains entrenched at the top of the rankings, a position it has held since August 2014.

Chart 8: Trailing 5-year Sharpe ratios



The US Corporate Index closed out the decade in style with a 2.26% excess return for the quarter. That lifted its full year excess return to 6.49% – a level that is more than triple the index's 10 year annualized excess return.

Chart 9: US Corporate Index 12-month excess returns

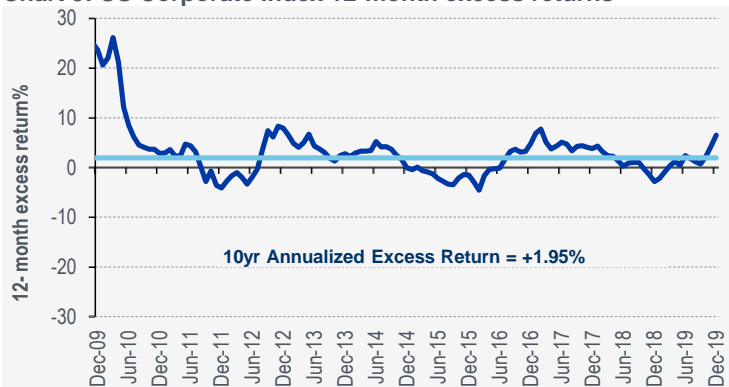


Table 7: US Corporate Index 12-month excess return

10yr Ann. Excess Return	1.95
Current	6.49
Hi (Mar-10)	26.12
Lo (Feb-16)	-4.55
Std. Dev	5.18

US Municipals

After posting a market-leading 4% return in Q3, taxable munis dropped to the bottom of the U.S. bond market rankings in Q4, and for the same reason – the index’s significant duration exposure (9.13 years at the end of 2019), which makes it more volatile than other U.S. bond market indices. But those that invested in taxable munis last year cannot complain too much – the index gained 11.44% on the year.

Tax-exempt munis did much better than their taxable muni peers on the quarter but they were unspectacular relative to the non-muni markets, at least before taking taxes into consideration. High Yield tax-exempt munis did better than their high grade tax-exempt muni counterparts but still came up a few basis points shy of high grade Corporates, and gained less than half as much as high yield Corporates pre-tax. But when the indices are adjusted for taxes, high grade tax-exempt munis are better than all non-muni indices other than high yield and emerging markets, and the high yield muni index did second best, falling within 0.34% of the high grade Corporate Index. The high yield muni performance during the quarter was fairly broad-based geographically with only five states landing in the red and only one down by more than half a percent (Georgia, -0.62%).

Chart 10: Q3 pre-tax total return

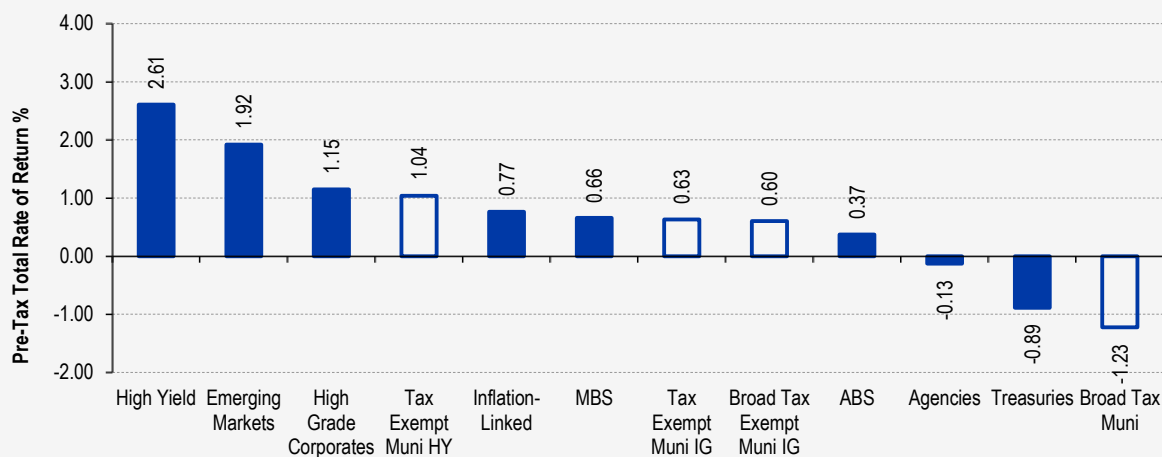
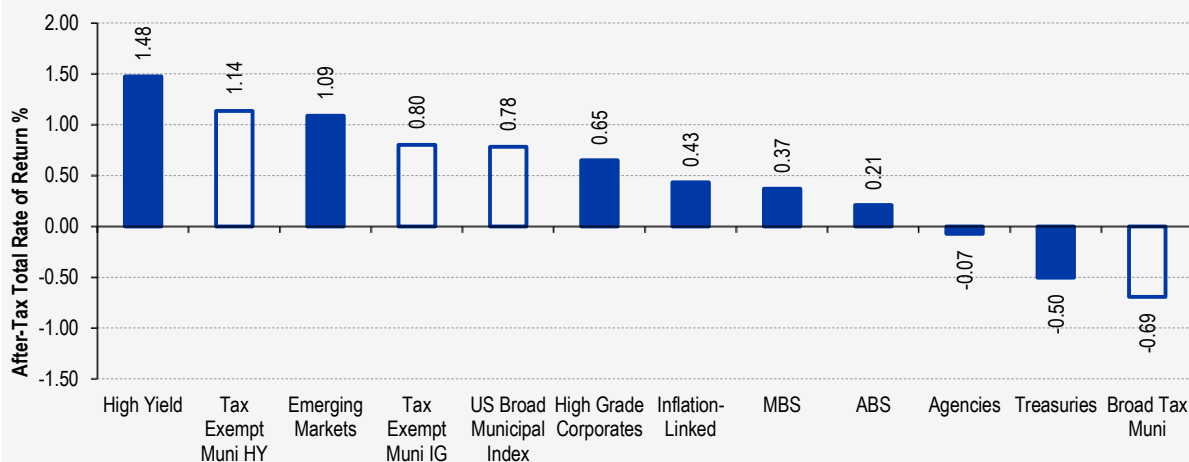


Chart 11: Q3 after-tax total return (post liquidation method using 43.4% tax rate)



An above average duration exposure in a rising rate environment was certainly the primary cause for the taxable muni index's poor showing in Q4, but it was not the sole reason. Adjusted for duration risk, the high grade taxable muni performance improves by more than a percent, lifting it off the bottom of the rankings ahead of Agencies and ABS. But a 0.48% excess return pales in comparison to high grade Corporates and is less than half that of the three tax-exempt muni indices, even before adjusting for taxes. On an after tax basis the high grade tax-exempt munis beat the high grade taxable muni excess return by roughly a 4:1 margin.

High yield munis were only marginally better than high grade munis in Q4 with a 0.08% higher pre-tax excess return (1.24% vs. 1.16%) and a 0.15% advantage after taxes (1.25% vs. 1.15%). Adjusted for both duration and taxes, the high yield muni index came within a few basis points of the high grade Corporate Index but fell short of high yield Corporates by 0.20%. But after outperforming high yield Corporates by 0.77% in Q3, the high yield muni index still had a solid lead for H2. The largest component of the muni high yield index – Puerto Rico with a 15.8% allocation – did not unduly influence performance this time around as Puerto Rico's 1.33% excess return was right in line with that of the index.

Chart 12: Q3 pre-tax excess return vs Treasuries

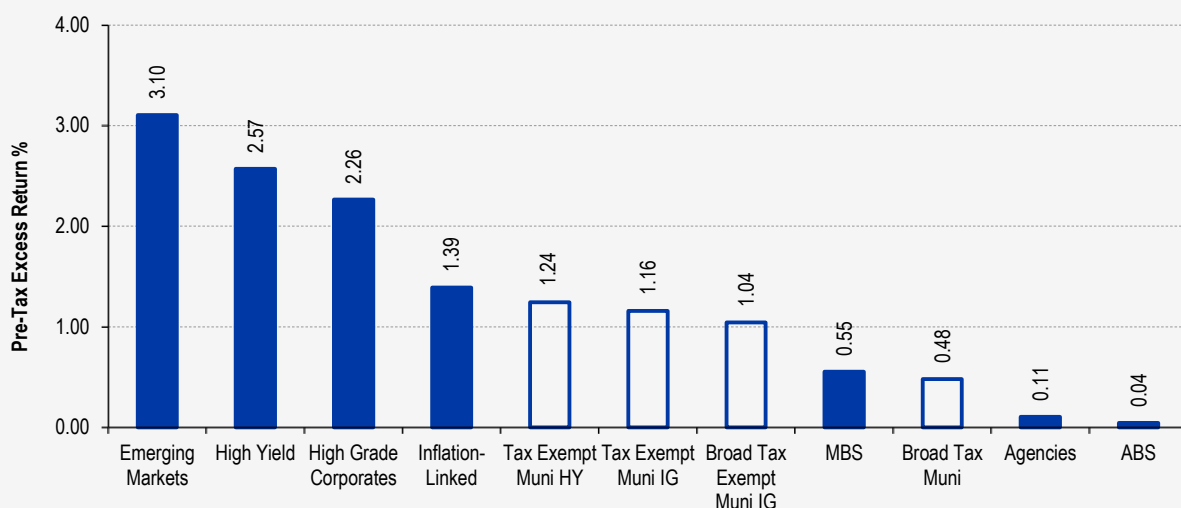
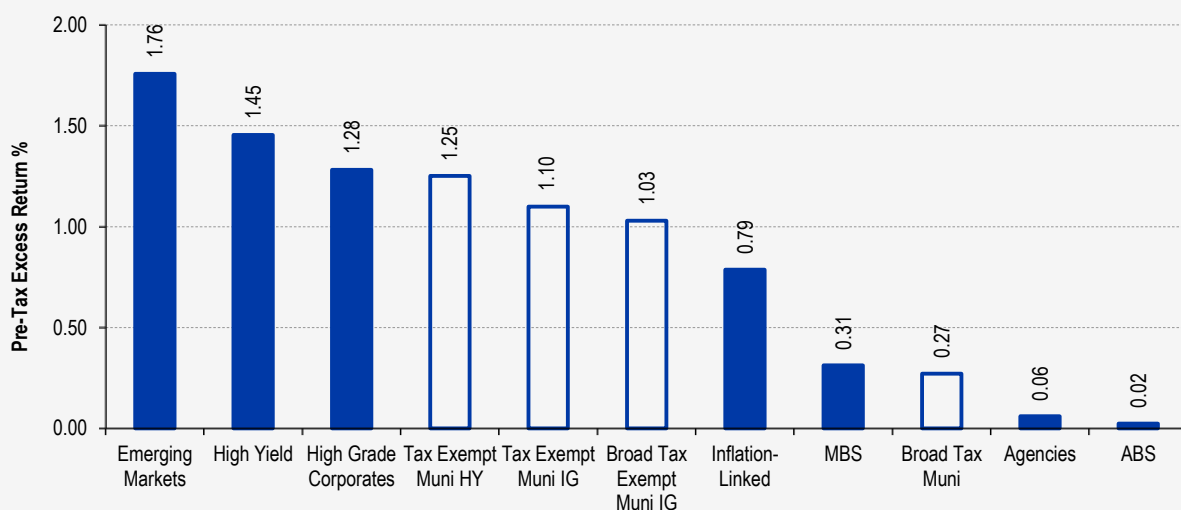


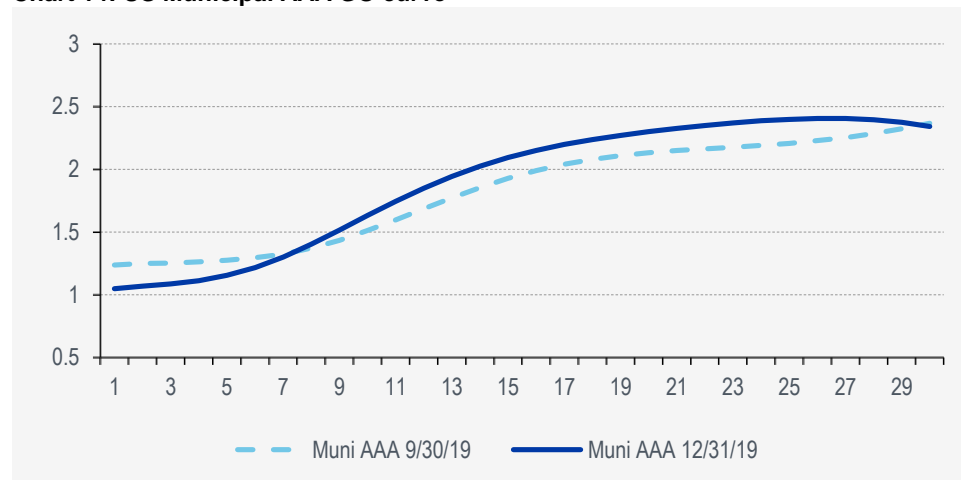
Chart 13: Q3 after-tax excess return vs Treasuries (post-liquidation method using 43.4% tax rate)



Yield Curve

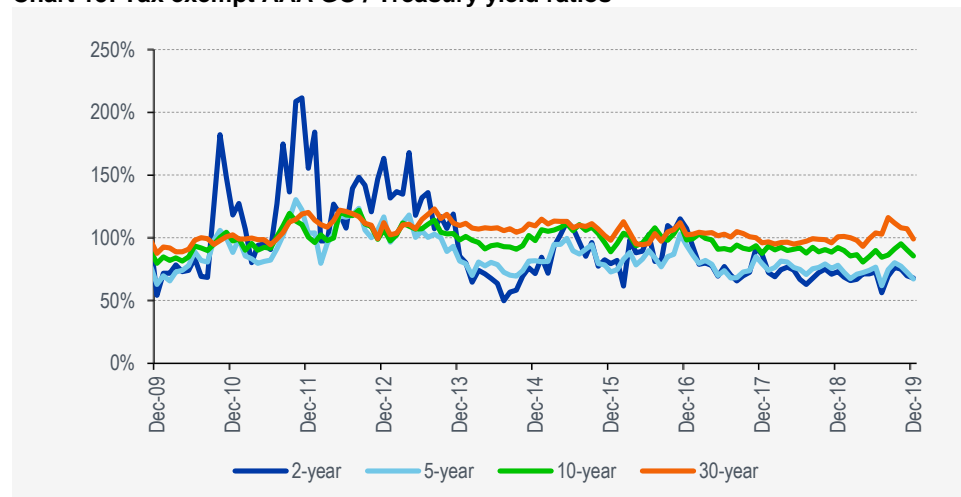
The AAA GO curve shifted 9bp higher, on average, in Q4 vs. a 23bp sell-off in the Treasury curve. AAA GO yield moved an average of 16bp higher in the 10-20 year part of the curve but rallied almost as much in the 2-5 year range. And while the 30-year Treasury sold off 24bp, the 30 year AAA GO rate moved 3bp lower.

Chart 14: US Municipal AAA GO curve



The stable performance at the long end of the AAA GO curve drove the 30-year ratio down to 0.99 from 1.12 at the beginning of the quarter – the first time it has been under the 1.0 mark since May. Don't expect it to go too much lower – the lowest reading over the last 5 years is 0.93 and the average over that period is 1.03.

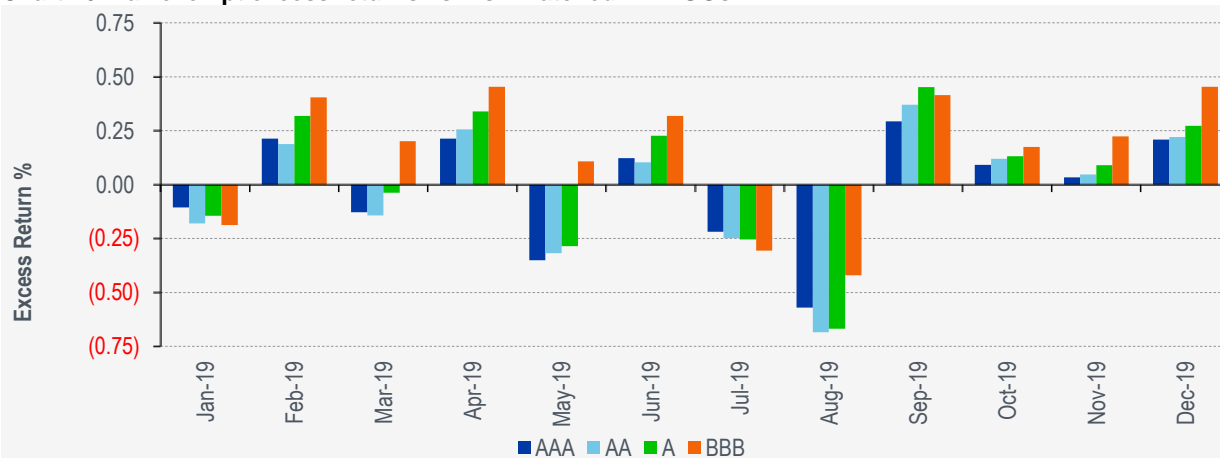
Chart 15: Tax exempt AAA GO / Treasury yield ratios



Rating

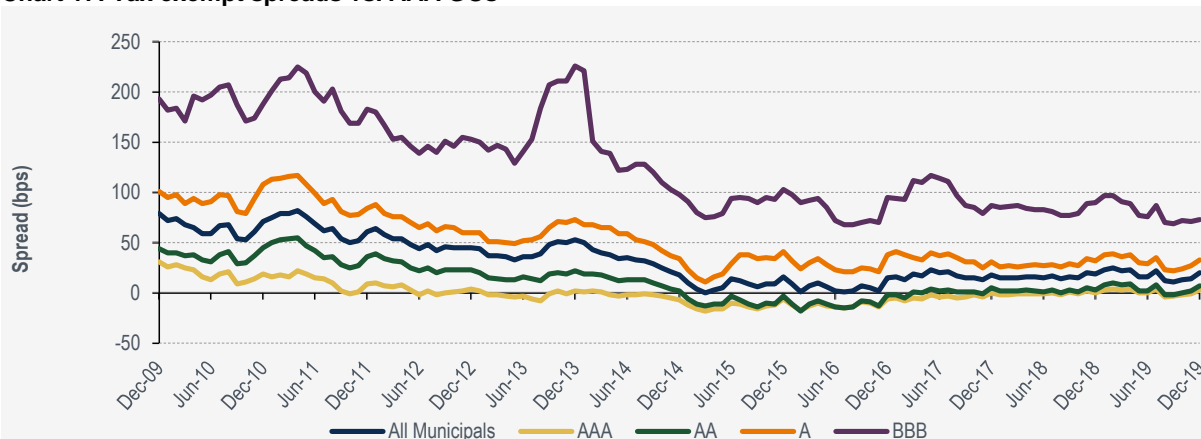
BBB excess returns outperformed all higher rated credits throughout the fourth quarter and for the eighth time this year – the ninth time if you include its close second place finish in September. During that stretch, BBBs managed to outperform in both up and down credit market cycles. The margins of outperformance in each individual month have not been overwhelming but they have added up to a 2.00% full year excess return that is four times that of next best single-As (+0.50%)

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



The BBB spread began the quarter 3.1 times that of the overall Muni Index and ended at just 2.2 times – a 10 year low. The narrowing of that ratio helped BBBs outperform in 2019 but could signal a tougher road ahead.

Chart 17: Tax exempt spreads vs. AAA GOs



Sector

Q4 saw stable performances across all high grade muni index sectors with every sector in the black every month of the quarter. But very few of those individual monthly performances exceeded a quarter percent and only one crept above the half percent mark (IDRs, 0.52% in December). As a result, a mere 0.41% separated the quarter's best (Single Family Housing, 0.86%) and worst (Hospitals, 0.45%) performers. Regardless of how small its margin of outperformance, in a quarter in which a rising curve was a key performance factor it is a little surprising to see Single Family Housing at the top of the list given its 11+ year duration (vs. 6.84 years for the overall Index). On the other hand, the bottom ranked Hospitals performance had much to do with its duration exposure, which at just over 9 years is second longest in the index to Single Family Housing.

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	12.36	6.64	0.82	0.57	7.08	0.34	-0.19
AA	53.13	6.68	3.55	0.59	7.21	0.39	-0.26
A	24.34	7.17	1.75	0.62	8.39	0.50	0.50
BBB	10.18	7.13	0.73	0.97	9.71	0.85	2.00
By Sector							
GO - State	14.87	5.41	0.80	0.77	6.74	0.38	0.27
GO - Local	10.44	7.16	0.75	0.57	7.85	0.40	0.05
Total GO	25.30	6.13	1.55	0.69	7.18	0.39	0.19
Refunded	4.53	2.48	0.11	0.69	3.60	0.04	0.08
Airport	5.45	7.46	0.41	0.71	8.13	0.66	0.04
Education	5.22	8.20	0.43	0.51	8.48	0.46	-0.24
Health	6.18	8.30	0.51	0.62	8.49	0.65	-0.12
Hospitals	3.68	9.02	0.33	0.45	9.13	0.60	-0.07
Housing - MF	0.89	8.82	0.08	0.69	7.33	0.82	-0.85
Housing - SF	1.13	11.33	0.13	0.86	7.92	1.21	-3.82
Industrial Develop	2.12	7.13	0.15	0.78	10.43	0.81	2.72
Leasing/Rental	5.01	6.05	0.30	0.62	7.05	0.30	0.20
Pollution Control	0.43	5.72	0.02	0.57	5.90	0.32	0.39
Power	2.84	5.90	0.17	0.61	6.69	0.34	-0.17
Tax Revenues	12.40	6.85	0.85	0.58	7.95	0.38	0.17
Tobacco	1.00	6.90	0.07	0.68	9.85	0.56	1.46
Toll & Turnpike	6.12	8.10	0.50	0.72	9.10	0.68	0.46
Transportation	7.30	6.82	0.50	0.61	8.36	0.45	0.87
Utilities - Other	5.29	7.21	0.38	0.54	7.90	0.40	0.01
Water & Sewer	4.44	6.91	0.31	0.59	7.51	0.42	-0.40
Miscellaneous	0.66	6.75	0.04	0.51	7.58	0.35	-0.11
Total Revenue	70.16	7.38	5.18	0.61	8.18	0.50	0.16
By Effective Duration							
0-1 Year	3.04	0.49	0.01	0.64	2.91	0.27	1.20
1-2 Year	8.17	1.52	0.12	0.58	2.67	0.04	0.19
2-3 Year	8.40	2.50	0.21	0.74	3.56	0.06	0.16
3-4 Year	7.83	3.46	0.27	0.87	4.58	0.13	0.20
4-5 Year	8.61	4.48	0.39	0.92	5.73	0.19	0.26
5-6 Year	8.24	5.50	0.45	0.87	6.60	0.27	0.09
6-7 Year	8.83	6.49	0.57	0.78	7.65	0.40	0.10
7-8 Year	8.49	7.50	0.64	0.58	8.57	0.45	-0.01
8-9 Year	7.84	8.50	0.67	0.56	9.21	0.65	-0.19
9-10 Year	8.62	9.52	0.82	0.47	9.85	0.77	-0.23
10-11 Year	7.75	10.49	0.81	0.40	10.49	0.84	-0.31
11-12 Year	6.39	11.44	0.73	0.38	11.49	0.91	-0.03
12+ Year	7.79	14.63	1.14	0.35	15.25	0.98	1.58
Broad Index	100.00	6.84	6.84	0.63	7.74	0.46	0.16

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State GO

After a very rough third quarter, Illinois led the State GO Index every month of the last quarter of the year with an impressive 1.53% return. That was enough to move Illinois into second place in the full year rankings ahead of Mississippi, which gained only half as much as Illinois in Q4. Connecticut, which along with Illinois is one of the states with the worst pension funding ratios (40% and 38% for Illinois and Connecticut, respectively), ranked second in Q4 with a 0.92% return. New Jersey also has a dismal funding ratio (38%) but unlike the other two it found itself at the bottom of the rankings with a 0.22% Q4 return that was second worst to West Virginia.

Though it cut the gap to top-ranked West Virginia in half, Illinois was not able to overcome the smaller state in the full year rankings. West Virginia's 10+ year duration exposure was an impediment to its performance in Q4 and it fell to the bottom of the quarterly rankings. However, it had built up an insurmountable lead over the rest of the field on the strength of the curve rally over the first nine months of the year and it managed to retain its place at the top of the rankings by a wide margin.

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

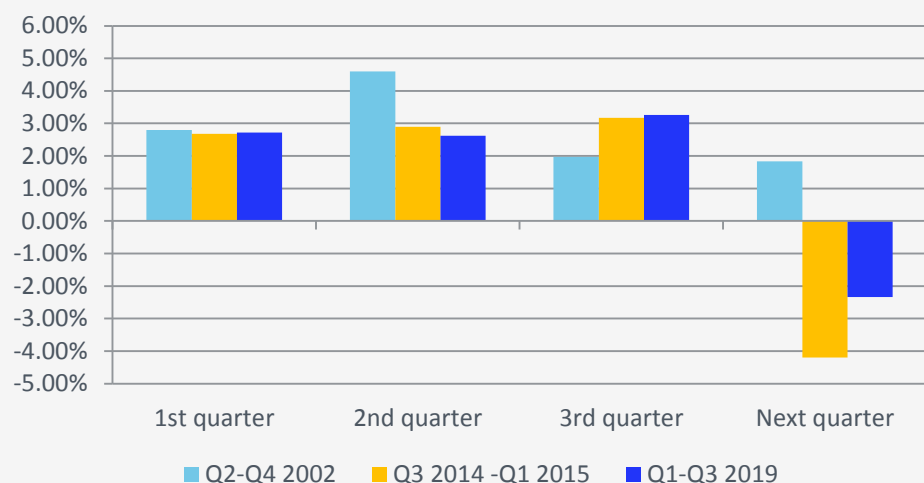
By State:	% wgt	Effective Duration	Contr EffDur	Total Return		Excess Return	
				3-Month	YTD	3-Month	YTD
Illinois	8.25%	5.08	0.42	1.53	9.36	1.04	3.15
Mississippi	0.63%	7.16	0.05	0.72	8.55	0.54	0.43
Massachusetts	10.76%	6.82	0.73	0.70	7.75	0.52	-0.04
West Virginia	0.16%	10.61	0.02	0.11	10.75	0.47	-0.07
California	33.82%	5.65	1.91	0.78	6.50	0.46	-0.05
Connecticut	4.01%	4.84	0.19	0.92	7.95	0.44	2.11
Oregon	0.20%	7.75	0.02	0.22	7.31	0.32	-0.75
New York	0.20%	4.68	0.01	0.71	4.91	0.29	0.11
Texas	4.64%	5.81	0.27	0.65	6.83	0.27	-0.23
North Carolina	1.43%	4.85	0.07	0.69	4.50	0.22	0.11
Pennsylvania	6.96%	5.28	0.37	0.65	7.20	0.20	0.43
Louisiana	0.82%	3.94	0.03	0.79	5.39	0.18	0.09
Wisconsin	2.65%	4.63	0.12	0.73	4.44	0.18	-0.07
Hawaii	2.92%	5.46	0.16	0.61	6.70	0.17	-0.16
Georgia	4.22%	5.41	0.23	0.51	6.49	0.13	-0.11
Washington	6.05%	5.04	0.30	0.53	6.19	0.12	-0.36
Maryland	5.82%	4.74	0.28	0.61	5.48	0.11	-0.27
Florida	1.28%	3.11	0.04	0.61	4.12	0.07	-0.05
Minnesota	1.38%	3.88	0.05	0.70	4.68	0.04	-0.07
Ohio	1.10%	4.11	0.05	0.71	5.34	0.02	-0.02
New Mexico	0.20%	3.14	0.01	0.72	4.95	0.01	0.06
Michigan	0.13%	4.47	0.01	0.69	5.91	0.00	0.13
Alabama	0.08%	3.28	0.00	0.67	4.00	0.00	-0.19
Delaware	0.31%	3.81	0.01	0.67	5.20	-0.01	-0.06
Maine	0.04%	2.82	0.00	0.75	3.93	-0.01	-0.02
Utah	0.32%	3.81	0.01	0.75	4.86	-0.02	-0.11
Virginia	0.21%	3.17	0.01	0.74	4.24	-0.02	0.02
Arkansas	0.30%	1.57	0.00	0.58	3.25	-0.03	0.06
Nevada	0.33%	3.65	0.01	0.75	5.17	-0.04	0.23
Rhode Island	0.09%	2.92	0.00	0.72	4.39	-0.05	0.21
Tennessee	0.21%	2.66	0.01	0.67	3.80	-0.07	-0.17
South Carolina	0.04%	0.51	0.00	0.35	2.25	-0.09	-0.36
New Jersey	0.43%	4.81	0.02	0.22	5.79	-0.24	0.18
GO - State (Total)	100.00%	5.41	5.41	0.77	6.75	0.38	0.28

Europe High Grade

After three strong quarters, the Pan-Europe Broad Market Index posted its fourth largest loss on record in Q4.

In last quarter's report we highlighted the fact that the Pan-Europe Index had its third best performance over three consecutive quarters since the adoption of the Euro at the end of 1998. But we left off with the observation that the recent run most closely emulated the index's performance from Q3 2014 to Q1 2015 and that was followed with a record 4.20% loss in Q2 2015. Well we can now complete that comparison and, sure enough, the index landed deep in the red in Q4 2019. It is true that this was by no means a record loss, and was less than half that incurred in Q2 2015. Nonetheless, a 2.34% loss is a very large setback for the index and ranks as the fourth worst in its 23 year history. Despite the large setback, the Pan-Europe Index still managed to finish 2019 with its best performance in 5 years.

Exhibit A: Pan-Europe Broad Market Index follow up sustained rallies



The Bund curve sold off more than Gilts but with significantly more duration exposure the Sterling Index took a much larger hit than Euro in Q4.

Both the Euro and Sterling components contributed to the sizable Pan-Europe Index loss in Q4. The Sterling market took the larger hit as it fell 3.06% in the face of a 35bp sell-off in the Gilt curve. The Bund curve sold off even more than Gilts (+39bp) but the Euro Broad Market Index has a third less duration exposure than the Sterling Broad Market Index (7.19 years vs. 11.34 years at the end of 2019). As a result, it only lost 2.18% in Q4, outperforming the Sterling Index by 0.89%. But Sterling had outperformed Euro markets by more than three times that differential in Q3 and therefore ended the year with a 1.96% return advantage over the Euro Index. That is the fourth time in the last six year that Sterling beat Euro by roughly 2% or more. The Euro Index came out on top in 2018 and 2015, but by a margin of only about a half a percent in both cases.

The Bund curve began the quarter in negative territory across all maturity points but finished with positive rates beyond the 14 year maturity point.

A 39bp quarterly sell-off in the Bund curve is not a common occurrence. Going back to 1997 we have seen a quarterly back up in rates of that magnitude a little more than once every 2½ years, on average. But the last time it happened was Q2 2015, or 4½ years ago, so arguably this sell-off was overdue. The fact that the entire curve was in negative territory at the start of the quarter also set the stage for a large sell-off. The Bund curve saw its first negative yields toward the end of 2012. Negative rates crept out a little beyond the 10 year maturity point in mid-2016 but shortly thereafter pulled back inside the 8 year maturity point. Then in 2019 negative rates again moved progressively farther out the curve, and by the end of Q3 all maturity points were in the red. Even with the Q4 sell-off rates are still negative out to 13 years – a state we had never seen prior to mid-year. So the Euro Index could very well be facing more curve losses in future quarters.

Exhibit B: German par coupon spline curve

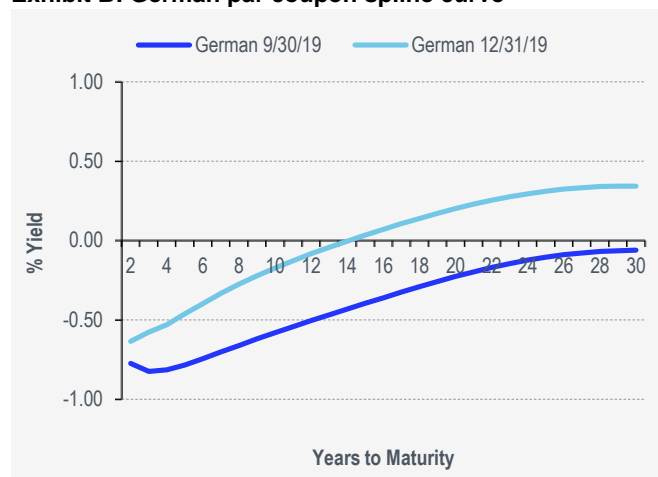
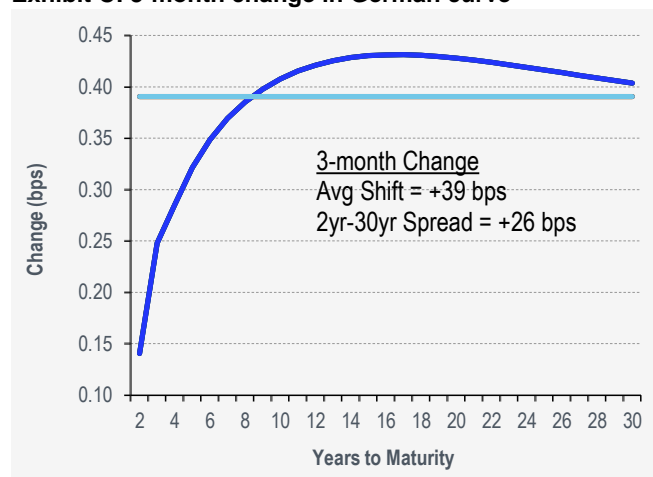
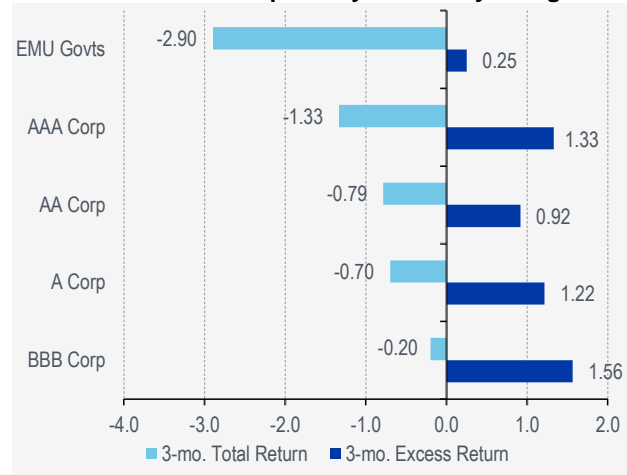
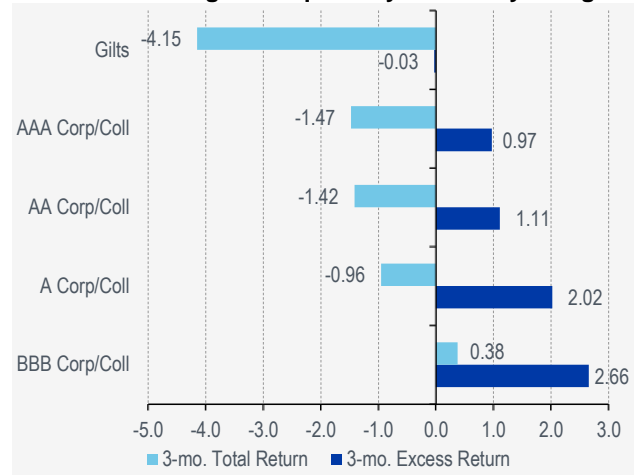


Exhibit C: 3-month change in German curve



Unlike other credit rating segments, spread tightening gains were enough to lift the Sterling BBB Corporate/Collateralized Index into the black for Q4.

Spread tightening gains in the Euro and Sterling Corporate Indices offset some, but certainly not all of the curve losses in Q4. Performance improved moving down the credit spectrum and in the BBB category the positive excess returns provided enough of an offset to get the Euro BBB Corporate Index close to break-even (-0.20% Q4 total return), while the Sterling BBB Corporate/Collateralized Index made it into the black (+0.38% Q4 total return). For the Sterling BBB Corporate/Collateralized Index that capped off a particularly strong year in which the index gained 11.65% – its best in 7 years. Of course, 2019's strong showing is partly attributed to the fact that it was rebounding from 2018 when it suffered its second worst loss on record (-2.40%). The index's 4.39% annualized return over the last two years was exceeded in seven of the previous nine years. And it is exactly 3.50% below its annualized return from its inception in 1997 through 2017. In that context, 2019's performance looks a little less spectacular.

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

Unlike Q3, Euro-sovereign excess returns were muted in Q4.

During Q3 it was the Euro-sovereigns that made the biggest contribution to the Euro Broad Market Index excess return for the quarter as the Euro sovereign ex-Germany component posted a 1.98% excess return on the quarter versus 0.56% for Euro corporates. This time around the two reverted to a more traditional relationship with corporates producing the larger excess returns (+1.36%) while the credit component of the ex-Germany sovereign index was muted (+0.31% excess return). The biggest QoQ change, by far, was Italy sovereigns. After surging 6.72% ahead of risk-matched Bunds in Q3, Italy gave back a modest 0.38% in Q4. Conversely, after missing out on the Q3 spread rally, Spain (1.03% excess return vs. 0.07% in Q3) and Ireland (1.89% excess return vs. -0.22% in Q3) both gained ground on risk-matched Bunds in Q4.

Rating migrations continue to trend lower but for the second time this year there were no fallen angels.

European rating migration statistics continued to trend lower in Q4 as the combined Euro/Sterling corporate index upgrade/downgrade ratio declined for a third straight quarter and as downgrades exceeded upgrades for a fifth straight quarter (\$81bn vs. \$40bn). In fact, the Q3 upgrade/downgrade ratio was the lowest we have seen since Q3 2017. On a more positive note, for the second time in the last four quarters the two corporate indices did not have any new fallen angels. Prior to this year you would have to go all the way back to Q4 2006 to find a quarter with no fallen angels.

Europe Corporates

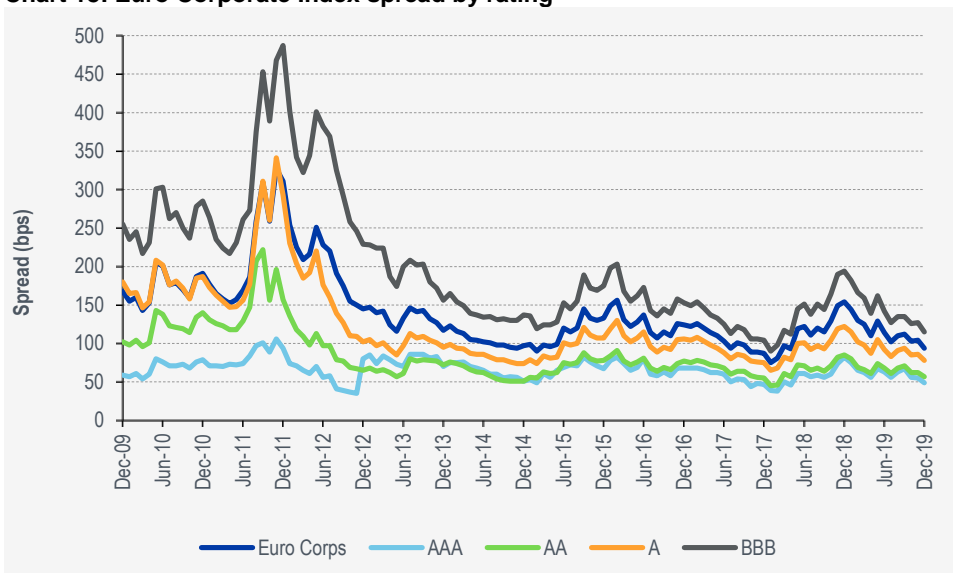
The Insurance sector tightened the most QoQ and YoY and has the highest excess return over all trailing periods shown in Table 10. However, the sector's volatility leaves information ratios closer to mid-pack, at best.

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	5.22	94	-18	-60	0.3	1.3	0.7	1.36	5.28	2.23	1.63	1.92	0.30	0.19	0.19	
Automotive	6.8	4.63	109	-20	-67	0.5	1.6	0.9	1.55	5.97	2.32	1.39	1.70	0.25	0.11	0.18	
Banking	29.1	4.17	86	-16	-58	0.2	1.2	0.6	1.00	4.34	2.08	1.60	1.97	0.34	0.23	0.17	
Basic Industry	5.1	5.04	94	-10	-51	0.3	1.4	0.7	1.21	4.72	1.94	1.11	1.52	0.31	0.10	0.15	
Capital Goods	3.1	5.69	88	-24	-66	0.4	1.2	0.7	1.58	5.47	1.31	1.14	1.54	0.13	0.13	0.18	
Consumer Goods	5.9	6.04	80	-22	-46	0.4	1.2	0.8	1.62	4.85	1.66	1.21	1.55	0.20	0.14	0.22	
Energy	5.3	5.46	100	-22	-74	0.4	1.3	0.7	1.56	5.70	2.62	1.96	1.74	0.32	0.14	0.17	
Financial Services	2.0	5.50	108	-12	-68	0.4	1.5	0.8	1.31	5.24	2.44	1.88	2.32	0.36	0.27	0.27	
Healthcare	5.3	7.04	79	-22	-41	0.6	1.4	0.9	1.83	4.76	2.14	1.40	1.29	0.24	0.16	0.18	
Insurance	4.7	5.49	140	-39	-116	0.3	1.2	0.6	2.77	10.54	4.94	3.53	3.94	0.35	0.20	0.18	
Leisure	0.2	4.06	102	-21	-49	0.2	1.3	0.6	1.26	3.50	1.89	2.06	2.77	0.46	0.35	0.24	
Media	1.2	4.88	94	-13	-52	0.4	1.2	0.7	1.06	4.90	2.26	1.60	2.23	0.37	0.19	0.29	
Real Estate	4.8	5.69	116	-15	-83	0.4	1.3	0.8	1.38	7.26	2.55	2.06	2.51	0.28	0.21	0.28	
Retail	1.5	5.38	88	-23	-46	0.4	1.3	0.8	1.47	4.49	1.61	1.02	1.34	0.20	0.09	0.15	
Services	1.4	4.94	91	-10	-54	0.3	1.2	0.7	0.96	4.44	1.84	1.46	2.17	0.32	0.25	0.34	
Technology & Electronics	2.8	5.44	72	-15	-37	0.2	1.3	0.6	1.08	4.08	1.82	1.29	1.25	0.29	0.16	0.14	
Telecommunications	7.0	6.12	94	-18	-57	0.3	1.2	0.7	1.51	5.72	2.30	1.65	1.81	0.27	0.18	0.18	
Transportation	4.4	5.82	102	-9	-43	0.3	1.6	0.8	1.06	4.64	1.50	1.25	1.52	0.19	0.17	0.16	
Utility	9.4	5.79	91	-16	-51	0.4	1.2	0.7	1.27	5.32	2.37	1.69	1.82	0.30	0.18	0.19	

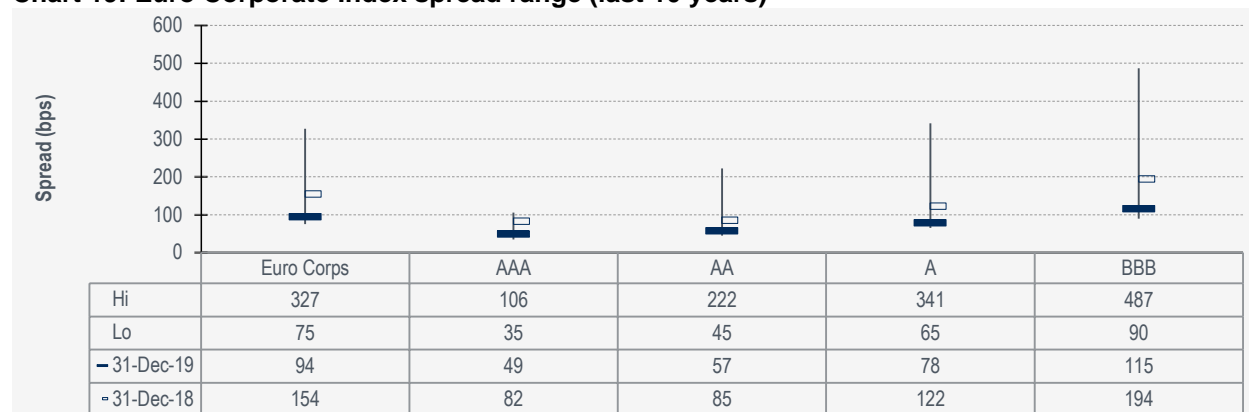
The index spread rallied 16% in Q4, with the higher-rated AAA and AA segments doing best (-27% and -20%, respectively).

Chart 18: Euro Corporate Index spread by rating



The overall index spread fell 39%, with all rating bands within a few percentage points of that level except for AAs (-33%).

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



While all rating band spreads ended the year far below their 10 year averages, the A-AA multiple remained right in line its historical average and the BBB-A multiple is just below its 10 year average.

Chart 20: 10-year maturity EUR corporate spreads

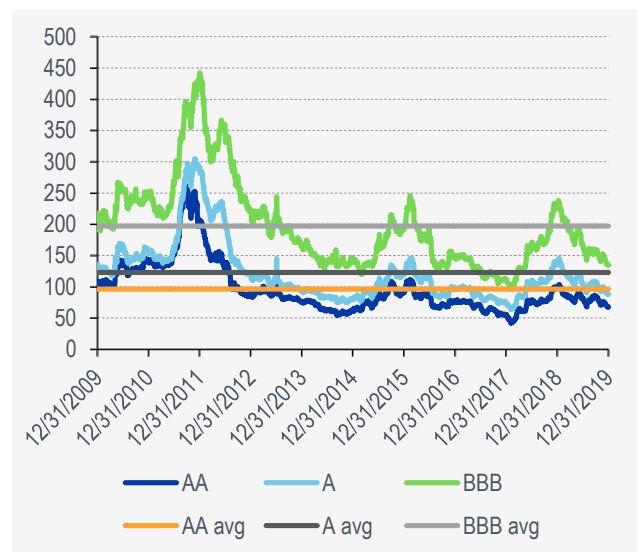
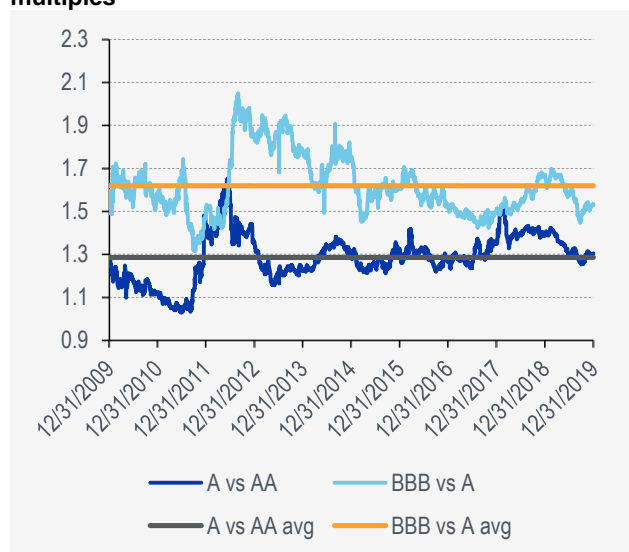


Chart 21: 10-year maturity EUR corporate spread multiples



Sovereigns retained the three bottom slots on the 5 and 10 year Sharpe ratio rankings. This time Italy joined Germany and Netherlands over the 5 year period. Corporate Sharpe ratios mostly declined QoQ but short Corporates remain at the top over the 5 and 10 year periods. The Securitized/Collateralized sector is rising in the rankings, and now ranks 3rd over the last 10 years.

Table 11: Euro Five- and Ten-Year Sharpe Ratios (as of 31 Dec 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%	0.24%	0.04	0.17				
Euro Broad Market	EMU0	2.10%	4.00%	3.28	3.42	0.31	0.36	0.00	0.02
Euro Sovereigns	EG00	2.23%	4.14%	4.17	4.29	0.27	0.31	0.01	0.02
1-3 Yr	EG01	0.19%	1.18%	0.58	1.29	0.26	0.23	0.03	0.01
3-5 Yr	EG02	0.94%	2.53%	1.55	2.40	0.30	0.30	0.02	0.01
5-7 Yr	EG03	1.72%	3.87%	2.65	3.57	0.30	0.33	0.01	0.02
7-10 Yr	EG04	2.88%	5.09%	4.14	4.91	0.31	0.32	-0.01	0.02
10+ Yr	EG09	4.32%	7.27%	9.44	8.88	0.24	0.28	0.00	0.03
Austria	G0H0	2.13%	4.51%	4.28	4.74	0.25	0.30	-0.01	0.01
Belgium	G0G0	2.61%	4.82%	5.08	5.53	0.25	0.28	0.00	0.02
Finland	G0K0	1.72%	3.63%	3.42	3.78	0.23	0.29	-0.01	0.01
France	G0F0	2.36%	4.28%	4.43	4.63	0.24	0.29	-0.01	0.01
Germany	G0D0	1.91%	3.74%	3.96	4.27	0.22	0.27	-0.02	0.01
Ireland	G0R0	2.49%	5.98%	3.56	9.55	0.31	0.20	0.01	0.01
Italy	G0I0	1.65%	4.26%	6.38	7.07	0.20	0.22	0.04	0.03
Luxembourg	G0LU	1.20%	3.32%	1.99	3.06	0.27	0.31	-0.03	0.01
Netherlands	G0N0	2.11%	4.04%	4.15	4.50	0.23	0.28	-0.01	0.01
Slovakia	G0SL	2.63%	4.96%	3.72	4.15	0.32	0.37	0.00	0.01
Slovenia	G0SV	4.12%	5.41%	4.52	7.20	0.37	0.24	-0.01	0.01
Spain	G0E0	3.12%	5.11%	4.23	6.33	0.33	0.26	-0.01	0.01
Quasi-Governments	EQ00	1.69%	3.49%	2.56	2.78	0.32	0.39	-0.01	0.01
1-3 Yr	EQ01	0.13%	1.35%	0.33	0.85	0.34	0.38	-0.04	-0.02
3-5 Yr	EQ02	0.85%	2.60%	1.06	1.86	0.37	0.39	-0.02	0.00
5-7 Yr	EQ03	1.65%	3.96%	2.09	2.92	0.34	0.40	-0.01	0.00
7-10 Yr	EQ04	2.79%	5.30%	3.55	4.34	0.33	0.37	-0.02	0.01
10+ Yr	EQ09	4.32%	7.37%	8.16	8.22	0.27	0.30	0.00	0.02
Securitized/Collateralized	EL00	1.36%	3.42%	1.72	2.36	0.36	0.42	-0.02	0.01
Corporates	ER00	2.36%	4.17%	2.62	3.03	0.36	0.41	-0.01	0.00
All Financials	EB00	2.34%	4.15%	2.23	3.23	0.41	0.38	-0.01	0.00
All Industrials	EJ00	2.32%	4.10%	2.95	2.93	0.32	0.41	-0.01	-0.01
All Utilities	EK00	2.55%	4.57%	2.98	3.36	0.35	0.40	-0.02	0.00
1-3 Yr	ER01	0.84%	2.05%	0.61	1.19	0.56	0.45	-0.03	-0.02
3-5 Yr	ER02	1.88%	3.70%	1.58	2.43	0.46	0.43	-0.01	-0.01
5-7 Yr	ER03	2.78%	5.09%	2.88	3.81	0.38	0.40	-0.01	0.00
7-10 Yr	ER04	3.60%	6.14%	4.35	5.32	0.34	0.35	-0.02	0.00
10+ Yr	ER09	4.49%	7.50%	6.94	7.05	0.28	0.34	-0.01	0.00
AAA	ER10	2.78%	4.42%	4.09	3.51	0.27	0.37	-0.02	0.00
AA	ER20	1.87%	3.49%	2.38	2.64	0.31	0.38	-0.02	-0.01
A	ER30	2.12%	3.88%	2.41	2.96	0.35	0.38	-0.03	-0.01
BBB	ER40	2.68%	4.71%	3.00	3.84	0.36	0.37	0.00	-0.01

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

The 10 year annualized excess return was little changed QoQ, but the FY-2019 result grew to an impressive +5.28% with Q4's significant spread rally.

Chart 22: Euro Corporate Index 12-month excess return

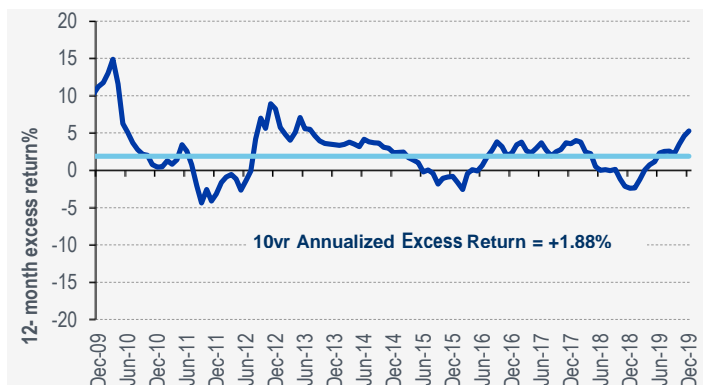


Table 12: Euro corporate Index 12-month excess return

10yr Ann. Excess Return	1.88
Current	5.28
Hi (Mar-10)	14.87
Lo (Sep-11)	-4.38
Std. Dev	3.32

Sterling Corporates

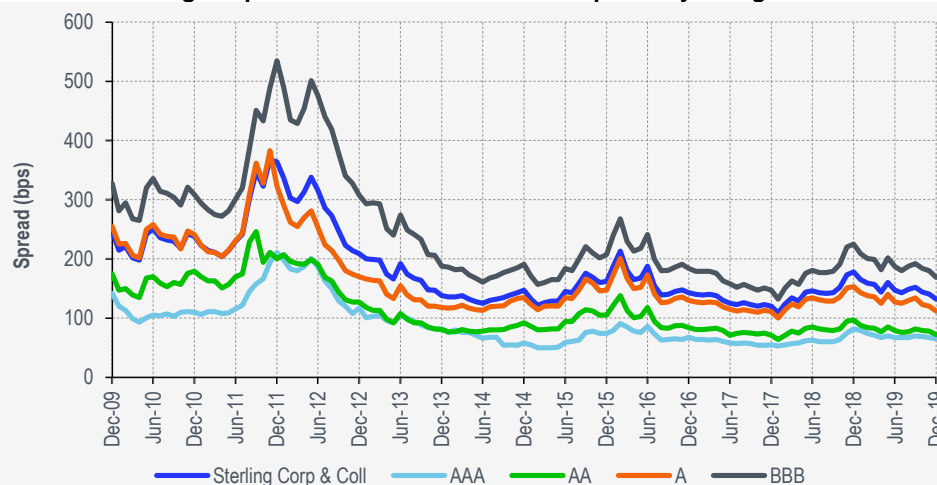
In a rebound, GE's rally made the Capital Goods sector one of the index's best performers in Q4. This sector is still the only one to have a negative excess return over the last 3 years and is at the bottom of the information ratio rankings over all three periods.

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	8.64	131	-22	-53	0.4	1.2	0.7	2.29	6.37	2.23	2.07	2.29	0.26	0.14	0.15	
Automotive	3.3	3.23	105	-13	-41	0.6	1.8	1.0	0.75	3.22	1.32	1.09	1.55	0.33	0.18	0.29	
Banking	22.2	5.76	122	-29	-62	0.2	1.2	0.6	2.07	5.80	2.75	2.33	2.76	0.31	0.16	0.14	
Basic Industry	2.2	7.86	104	-19	-44	0.2	1.1	0.6	1.65	4.90	2.55	2.49	2.61	0.37	0.13	0.16	
Capital Goods	1.8	8.90	168	-31	-89	0.6	2.1	1.1	3.53	9.91	-0.98	0.19	1.14	-0.03	0.02	0.08	
Consumer Goods	4.6	6.61	116	-12	-42	0.6	1.3	0.9	0.97	3.67	0.46	0.91	1.52	0.08	0.09	0.16	
Energy	2.7	6.93	106	-20	-55	0.5	1.2	0.8	1.37	4.31	1.74	1.69	1.48	0.30	0.12	0.15	
Financial Services	2.7	9.65	148	-20	-80	0.5	1.4	0.8	2.35	5.96	2.91	2.99	3.22	0.37	0.25	0.25	
Healthcare	2.8	12.05	100	-19	-28	0.6	1.3	1.0	2.58	4.81	0.83	1.67	1.30	0.11	0.11	0.10	
Insurance	9.0	6.50	183	-36	-76	0.4	1.3	0.7	3.42	9.71	5.24	3.60	4.76	0.38	0.17	0.19	
Leisure	0.4	4.65	139	-18	-50	0.4	1.3	0.8	1.18	4.30	1.59	1.68	2.63	0.30	0.18	0.28	
Media	1.0	9.50	179	-6	-20	0.7	1.5	1.0	2.55	5.50	1.56	1.62	1.96	0.17	0.10	0.14	
Real Estate	11.0	12.63	147	-20	-39	0.5	1.3	0.9	2.52	6.55	1.88	1.76	2.63	0.23	0.14	0.23	
Retail	2.4	8.44	117	-15	-26	0.6	1.2	0.9	1.71	4.26	1.85	1.98	1.32	0.29	0.14	0.12	
Services	2.5	19.27	74	-16	-26	0.3	1.2	0.6	3.50	8.74	0.71	1.10	1.71	0.07	0.10	0.19	
Technology & Electronics	1.3	7.67	107	-6	-8	n.a.	n.a.	n.a.	1.46	4.30	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	
Telecommunications	7.5	10.18	147	-21	-51	0.5	1.2	0.8	2.82	7.05	2.52	2.17	1.85	0.22	0.13	0.12	
Transportation	3.9	9.18	120	-11	-43	0.4	1.5	0.8	1.33	4.93	1.01	1.23	1.37	0.18	0.13	0.14	
Utility	18.7	9.79	127	-19	-50	0.5	1.1	0.8	2.47	7.17	2.05	2.12	1.79	0.20	0.13	0.12	

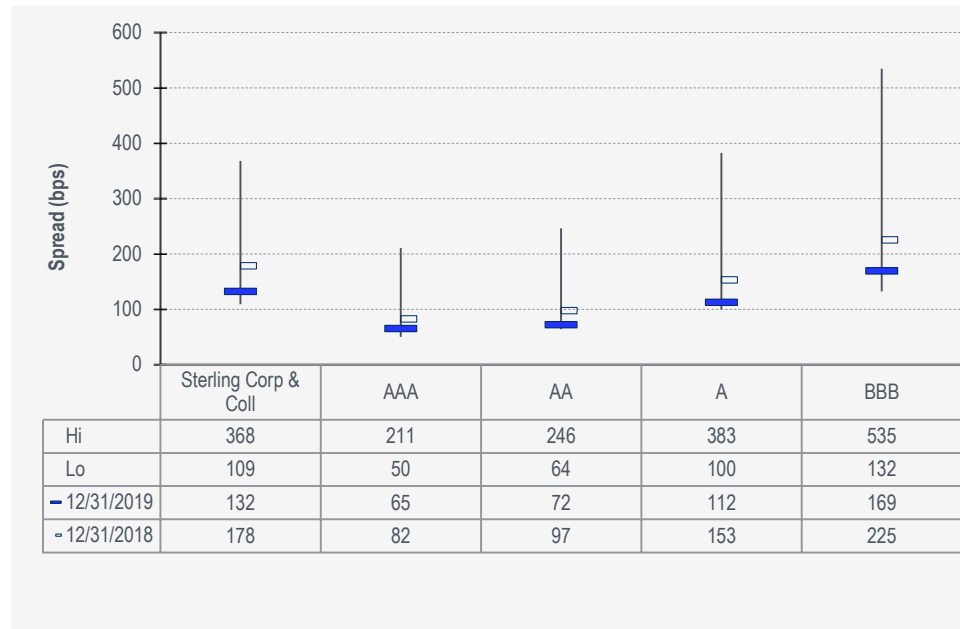
The Q4 rally saw a 13% drop in the Sterling Corporate & Collateralized Index spread – exactly half the 26% FY 2019 rally.

Chart 23: Sterling Corporate & Collateralized Index spread by rating



Spreads declined at least 20% YoY across all ratings.

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



With Q4's rally, spreads moved farther from their 10 year averages. The A-AA spread multiple had been drifting higher but is now as low and close to its long-term average as it has been in about two years.

Chart 25: 10 Year GBP corporate spreads

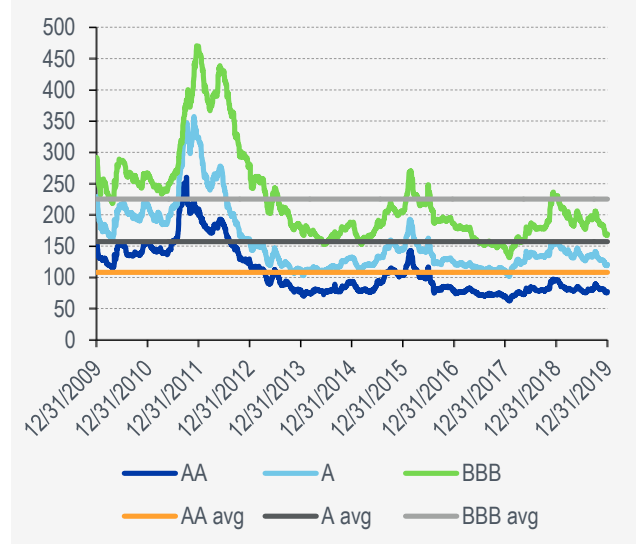
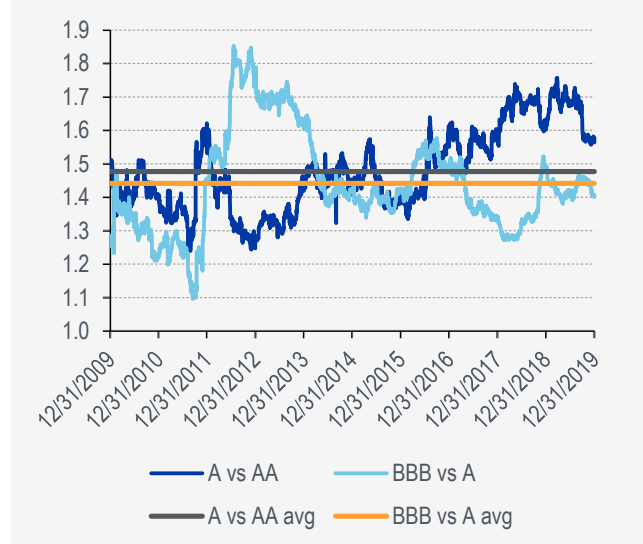


Chart 26: 10 Year GBP corporate spread multiples



5 and 10-year Sharpe ratios declined almost across the board QoQ. Lately curve exposure has meant more than credit exposure in the Sterling market, and short Corporate Sharpe ratios are more than twice those of long maturity bands. Compared to that, the differences across the ratings bands is relatively small.

Table 14: Sterling Five- and Ten-Year Sharpe Ratios (as of 31 Dec 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	0.59%	0.64%	0.06	0.06				
Sterling Broad Market	UK00	4.25%	5.91%	6.50	5.79	0.17	0.26	-0.08	-0.01
Gilts	G0L0	4.09%	5.67%	7.28	6.48	0.15	0.23	-0.09	-0.01
1-3 Yr	G1L0	0.54%	1.07%	0.81	0.83	-0.02	0.15	-0.10	-0.03
3-5 Yr	G2L0	1.43%	2.54%	2.13	2.23	0.12	0.25	-0.10	-0.02
5-7 Yr	G3L0	2.15%	3.59%	3.41	3.52	0.13	0.24	-0.09	0.00
7-10 Yr	G4L0	3.30%	5.22%	5.22	5.20	0.15	0.25	-0.08	0.00
10+ Yr	G9L0	6.21%	8.33%	11.47	10.31	0.15	0.22	-0.08	-0.01
Non-Gilts	UN00	4.60%	6.44%	5.35	5.17	0.22	0.32	-0.05	-0.01
Quasi-Government	UQ00	3.04%	4.46%	4.30	4.12	0.17	0.27	-0.07	0.00
1-3 Yr	UQ01	1.08%	1.57%	0.75	0.77	0.18	0.34	-0.08	-0.03
3-5 Yr	UQ02	1.77%	2.76%	1.99	2.11	0.17	0.29	-0.08	-0.02
5-7 Yr	UQ03	2.69%	4.31%	3.21	3.41	0.19	0.31	-0.09	-0.01
7-10 Yr	UQ04	3.77%	5.66%	4.66	4.69	0.20	0.31	-0.08	-0.01
10+ Yr	UQ09	5.55%	7.62%	8.67	8.19	0.17	0.25	-0.08	0.00
AAA	UQ10	2.71%	4.23%	3.93	3.96	0.16	0.26	-0.07	0.00
AA	UQ20	3.61%	3.98%	5.28	4.65	0.17	0.21	-0.08	-0.01
Corporate & Collateralized	UC00	5.06%	7.03%	5.77	5.64	0.23	0.32	-0.05	-0.01
All Financials	UF00	5.17%	7.17%	4.97	5.90	0.27	0.32	-0.03	0.00
All Industrials	UI00	4.95%	6.69%	6.29	5.78	0.20	0.30	-0.05	-0.01
All Utilities	UU00	5.67%	7.43%	7.59	7.05	0.20	0.28	-0.05	0.00
1-3 Yr	UC01	2.26%	3.31%	0.94	1.40	0.51	0.54	-0.04	-0.02
3-5 Yr	UC02	3.31%	4.87%	2.12	3.01	0.37	0.40	-0.05	-0.02
5-7 Yr	UC03	4.45%	6.50%	3.32	4.13	0.33	0.40	-0.05	-0.01
7-10 Yr	UC04	4.96%	7.22%	4.80	5.57	0.26	0.34	-0.05	-0.01
10+ Yr	UC09	6.47%	8.51%	8.78	8.06	0.20	0.28	-0.04	0.00
AAA	UC10	3.66%	6.08%	4.95	4.91	0.18	0.32	-0.07	-0.01
AA	UC20	4.66%	6.48%	5.81	5.65	0.21	0.30	-0.06	-0.01
A	UC30	5.12%	6.78%	6.62	6.32	0.20	0.28	-0.05	-0.01
BBB	UC40	5.29%	7.70%	5.29	5.47	0.26	0.37	-0.03	-0.01

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

There was little change QoQ in the 10 year annualized excess return.

Chart 27: Sterling Corporate Index 12-month excess return

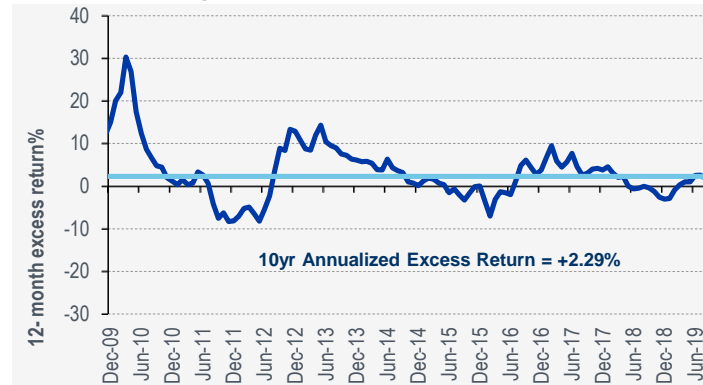


Table 15: Sterling corporate Index 12-month excess return

10yr Ann. Excess Return	2.29
Current	6.37
Hi (Mar-10)	30.33
Lo (Nov-11)	-8.30
Std. Dev	6.53

High Yield

Global High Yield Index (HW00)

For the seventh time in its 22 year history the Global High Yield Index finished the year with a clean slate of four positive quarterly returns.

After a break-out performance in the first quarter of the year, the Global High Yield Index slowed progressively in Q2 and Q3. It was still squarely in the black but if that trend were to continue, the fourth quarter would have been at risk. However, in our prior report we pointed out that in the past, during years in which the index had positive returns in each of the first three quarters it almost always managed a positive return in the fourth quarter as well. In seven observations there was only one exception to that rule (2007). Sure enough, history repeated itself in 2019 and the index posted a fourth straight positive quarterly return in Q4.

Not only did the index stay in the black in Q4 but it also posted its second best quarter of the year. In the 7 prior years in which the index was positive in the first three quarters of the year the fourth quarter, while also positive six out of seven times, was typically the third or fourth best quarter of the year. Only once previously did it rank higher than third best (2006). But 2006 produced a much lower full year return than 2019 (11.68% vs. 13.95%) making the current year's Q4 showing all the more impressive. Carrying this analysis one step further, it is interesting to note that in six of seven years the index also posted a positive return in the first quarter of the next year. Five of those follow up quarterly returns were in the 1-2% range, one was less than 1% (0.62% in Q1 2018), and one landed in the red (-1.77% in Q1 2008).

Exhibit A: Global High Yield performance in years with positive returns in the 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	2.78	0.49	1.62	4.15	5.91	(1.33)	4.09	5.68
Full Year	13.95	7.64	15.90	18.77	60.62	1.56	11.68	28.20

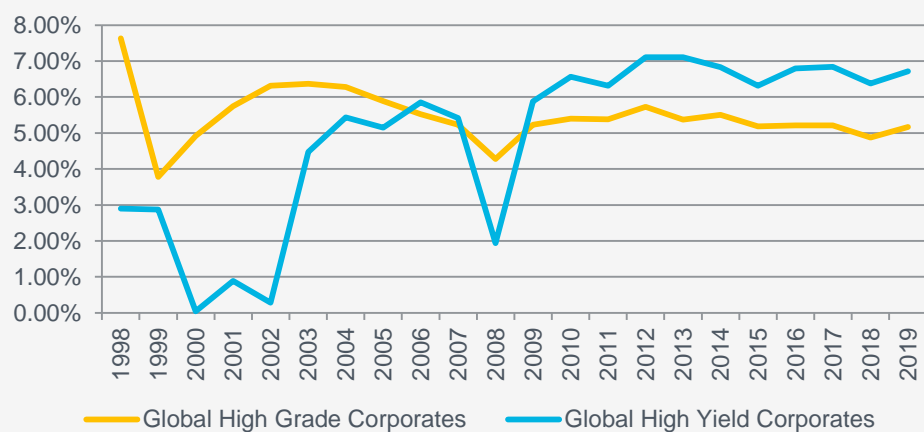
The index bounced back strong from 2018's loss, but the two-year annualized return is still below its annualized return since inception.

The 13.95% 2019 return is impressive but we cannot ignore the fact that it comes on the heels of a sizeable loss in 2018 (-2.41%). The annualized return for the two years combined is 5.45%, which is not too bad but it is below the index's annualized return since inception (6.71%). Year to year performance in a volatile asset class such as high yield will always be a little bumpy so it is important to take a longer term view. The Global High Yield Index now has just over two decades of historical returns and a chart showing the progression of its annualized return since inception suggests that there may be enough historical data to establish a general range of expectation over the long term.

Exhibit B shows the index's annualized return since inception at the end of each year over its lifetime. At the end of 1998 the index had exactly one year of history, so its annualized return since inception and its 2.90%

1998 full year return are one and the same. The 1999 annualized return since inception covers two years of performance, and so on until we get to 2019's 6.71% annualized return over the entire 22 year period. In the early years, the annualized return was quite volatile as individual years could significantly influence the results. Then there was the financial crisis which took things to a whole different level. But in the decade following the recovery from that crisis the index annualized return seems to have settled into the 6-7% range. We next overlaid a similar chart for the Global High Grade Corporate Index (using an assumed 12/31/19967 inception date for consistency). That too has been relatively stable over the past decade and currently it shows that high yield has about a 1.5% return advantage over high grade Corporates.

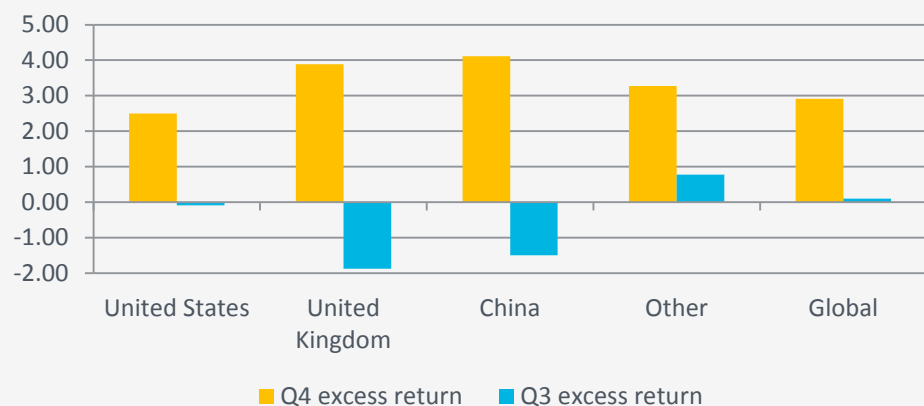
Exhibit B: Global High Yield Index (HW00) total return % by rating



After lagging in Q3, countries affected by trade wars and Brexit bounced back in Q4.

In our third quarter report we highlighted the fact that trade wars and Brexit seemed to be taking a toll on issuers in affected countries. The average Q3 excess returns of U.S., U.K. and China issuers were well below that of all other issuers in the Global High Yield Index with the U.K. contingent being the worst of the lot. Things settled down a bit in Q4 and the U.K. and China issuers outperformed the rest of the field, though they did not completely close the gap from the prior quarter. The U.S. continues to lag but by a smaller margin than in Q3.

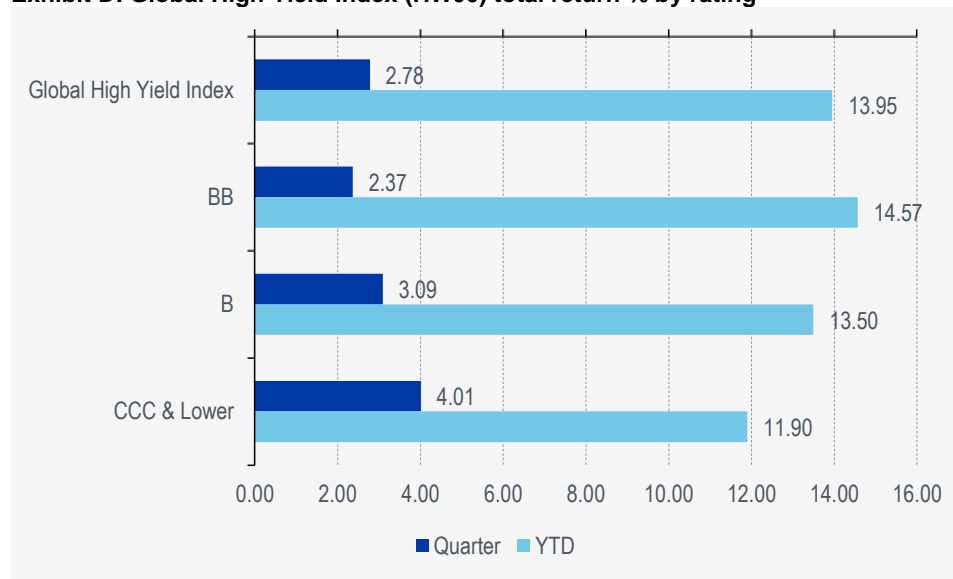
Exhibit C: Global High Yield Index (HW00) total return % by rating



In 2019, CCC investors were paid 3% less than BB investors for assuming significantly more risk.

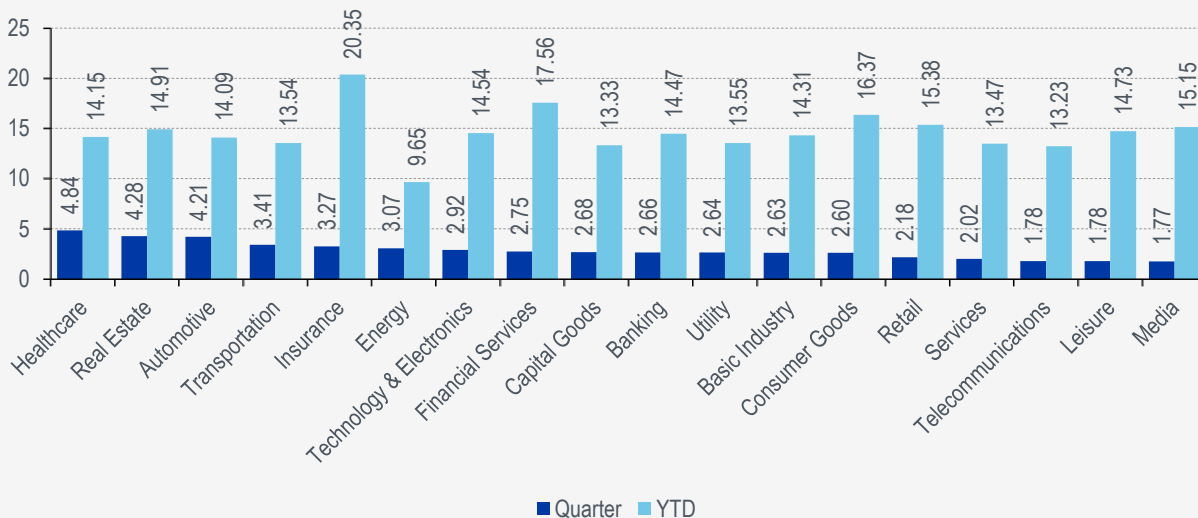
High Yield had a strong quarter as it posted a 2.78% return that is just over a percent better than the 1.76% average quarterly return it has generated over its 22 year history. That would suggest a favorable credit environment and sure enough Q4 returns improved with each step down the rating spectrum. However, for the year the opposite is true with BBs on top at 14.57%, followed by Bs at 13.50% and the CCC & Lower sub-index at the bottom of the pile with a 11.90% return for the year. On one hand it is hard to be disappointed with a double-digit return, but CCC investors got 3% less than BB investors for assuming significantly more risk.

Exhibit D: Global High Yield Index (HW00) total return % by rating



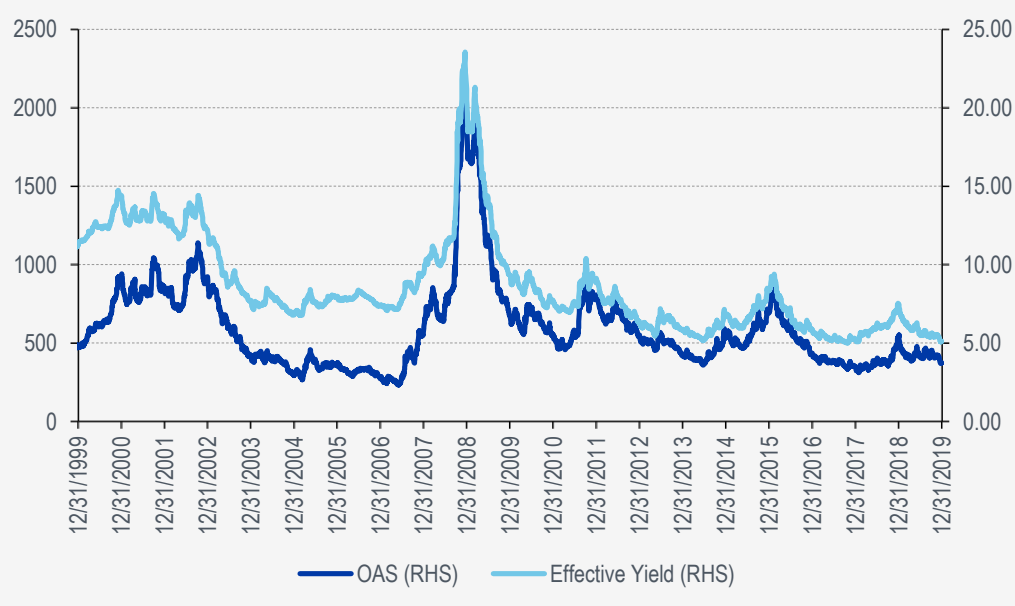
Healthcare, Real Estate and Automotive were the clear winners in Q4, and all were laggards the prior quarter. For the year it was the financials, particularly Insurance and Financial Services, that did best.

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



The index spread ended Q4 at 375bp – a 12% decline on the quarter, and down nearly a third YoY.

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



Many sectors ended 2019 just above their 10 year lows. That includes the Healthcare sector, which tightened the most in Q4. Telecom was the only sector to widen (modestly) and it is also close to its 10 year mean spread.

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	291	-103	-158	0.5	1.5	0.8
Banking	282	-43	-135	0.3	1.3	0.6
Basic Industry	327	-81	-211	0.4	1.3	0.7
Capital Goods	292	-36	-182	0.4	1.1	0.7
Consumer Goods	337	-68	-234	0.4	1.1	0.7
Energy	567	-51	-68	0.4	1.6	0.9
Financial Services	336	-39	-204	0.4	1.2	0.7
Healthcare	329	-117	-173	0.4	1.1	0.7
Insurance	360	-63	-189	0.3	1.1	0.7
Leisure	262	-16	-193	0.3	1.1	0.5
Media	254	-16	-219	0.3	1.0	0.5
Real Estate	571	-70	-143	0.4	1.6	0.9
Retail	454	-56	-208	0.5	1.0	0.8
Services	357	-29	-215	0.4	1.1	0.7
Technology & Electronics	258	-66	-214	0.3	1.1	0.5
Telecommunications	431	5	-132	0.5	1.3	0.9
Transportation	472	-56	-191	0.5	1.3	0.8
Utility	345	-22	-140	0.4	1.3	0.7
Global High Yield Index	375	-50	-165	0.4	1.2	0.7

The 5-year Sharpe ratios were on the rise in general QoQ, but External EM Corporates made the biggest move and now challenge European Issuers HY near the top of the rankings.

Table 17: Five- and Ten-Year Sharpe Ratios (as of 31 Dec 2019)

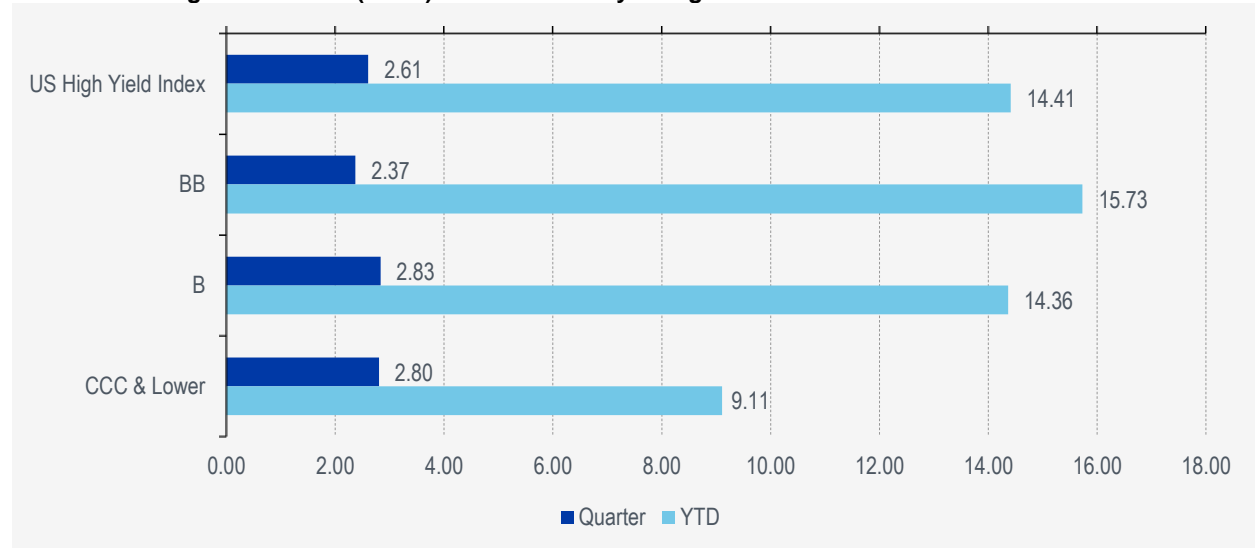
Index	Ticker	Ann. Total Return		Ann. Std. Dev.		Sharpe Ratio		Chg vs Prior Qtr	
		5yr	10yr	5yr	10yr	5yr	10yr	5yr	10yr
3-Month Treasury Bill	G001	1.07	0.58	0.26	0.23				
US Treasury	G0Q0	2.41	3.21	3.90	3.70	0.10	0.21	-0.05	0.01
Global High Yield	HW00	6.32	7.72	4.94	5.84	0.30	0.35	0.05	-0.01
Original Issue High Yield	HWHY	5.95	7.19	4.88	5.75	0.29	0.33	0.05	-0.01
Fallen Angels	HWFA	7.82	9.86	5.35	6.40	0.36	0.41	0.03	-0.01
US High Yield	H0A0	6.13	7.50	5.35	5.82	0.27	0.34	0.04	-0.02
BB	H0A1	6.27	7.67	4.49	5.02	0.33	0.40	0.02	-0.01
B	H0A2	5.96	7.15	5.45	5.70	0.26	0.33	0.05	-0.01
C	H0A3	6.05	7.56	10.05	9.92	0.15	0.21	0.04	-0.02
US Original Issue HY	H0HY	5.78	7.07	5.23	5.79	0.26	0.32	0.04	-0.02
US Fallen Angels	H0FA	8.50	10.07	6.54	6.33	0.32	0.42	0.03	-0.01
US Non-Distressed	H0ND	6.30	7.53	4.35	5.01	0.34	0.39	0.04	-0.01
US Distressed	H0DI	-1.90	1.64	18.02	16.27	-0.02	0.04	0.06	-0.02
US High Yield Constrained	HUC0	6.14	7.48	5.35	5.81	0.27	0.34	0.04	-0.02
European Currency High Yield	HP00	5.05	7.95	4.29	6.85	0.27	0.31	0.01	-0.01
European Currency HY Constr	HPC0	5.05	7.99	4.29	6.91	0.27	0.31	0.01	-0.01
Euro High Yield	HE00	4.70	7.55	4.48	6.81	0.23	0.29	0.01	-0.01
Euro High Yield Constrained	HEC0	4.69	7.59	4.48	6.89	0.23	0.29	0.01	-0.01
Sterling High Yield	HL00	6.97	10.30	3.77	7.62	0.44	0.36	0.02	-0.02
European Issuers High Yield	HWP0	6.28	8.10	4.02	6.63	0.37	0.32	0.04	-0.01
European Issuers HY Constr	HQ0C	6.28	8.10	4.01	6.67	0.37	0.32	0.04	-0.01
Global HY & EM Plus	HA00	5.75	7.31	4.47	5.29	0.30	0.36	0.04	-0.01
EM External Sovereigns	EMGB	5.32	6.38	4.90	5.52	0.25	0.30	0.02	0.00
EM External Corporates	EMCB	5.60	6.19	3.60	4.60	0.36	0.35	0.08	0.00

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)

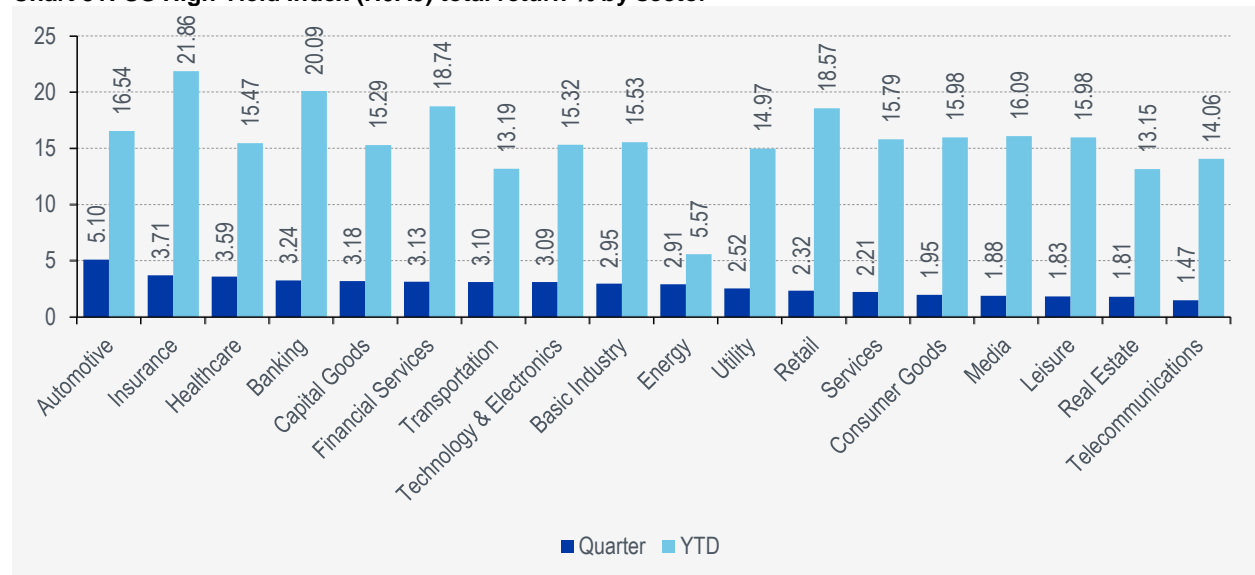
The lower-rated tiers did better in Q4, but the gap was modest. For 2019 as a whole BBs won the race, with CCCs the clear laggard.

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



Automotive was Q4's best performer and ended 2019 with one of the better full year results. Energy (5.57%) is the only sector not to deliver at least a 13% total return for the year.

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



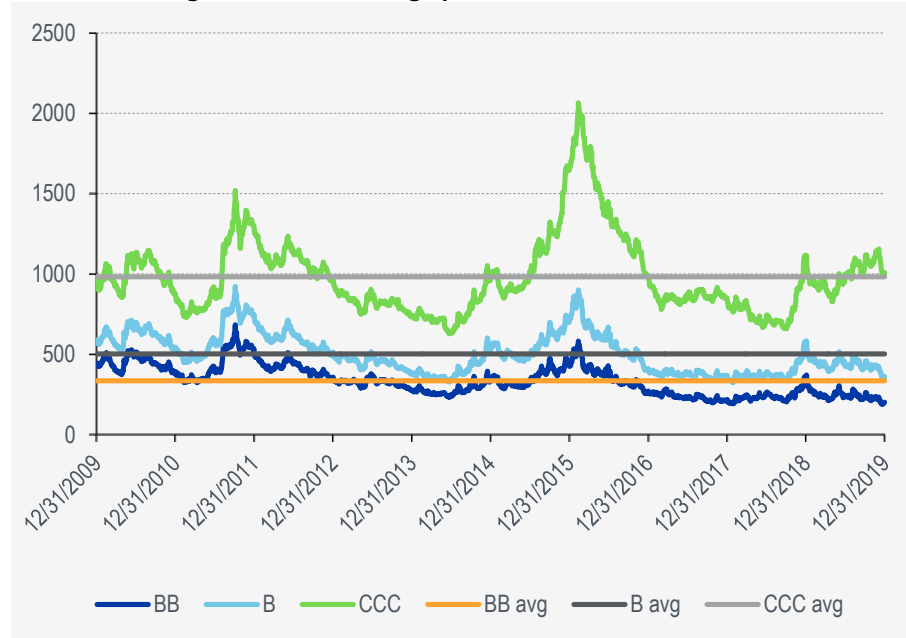
Only two sectors remain above their 10 year average spreads: Energy and Publishing & Printing. The biggest rallies in Q4 were triple digits, including Capital Goods, which ended the year at its 10 year spread low.

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	343	-7	-162	0.4	1.3	0.7
Air Transportation	H0AI	242	49	-138	0.3	1.3	0.5
Automotive & Auto Parts	H0AU	308	-103	-125	0.5	1.5	0.8
Banks & Thrifts	H0BA	197	-37	-139	0.2	1.1	0.6
Broadcasting	H0BR	239	-12	-133	0.2	1.0	0.4
Building Materials	H0BL	281	-35	-189	0.3	1.4	0.7
Cable/Satellite TV	H0CV	193	-20	-283	0.3	1.0	0.5
Capital Goods	H0CA	290	-115	-276	0.4	1.0	0.6
Chemicals	H0CH	283	-61	-251	0.3	1.2	0.6
Consumer Products	H0CO	300	-75	-283	0.4	1.0	0.6
Containers	H0CT	254	-14	-135	0.3	1.2	0.6
Div. Financial Services	H0FI	281	-52	-239	0.3	1.0	0.6
Div Media	H0DM	244	-12	-242	0.3	1.1	0.5
Energy	H0EN	673	-44	-20	0.4	1.9	1.1
Entertainment/Film	H0ET	289	-28	-133	0.4	1.3	0.7
Environmental	H0EV	206	-39	-229	0.2	1.0	0.4
Food & Drug Retail	H0FR	474	-116	-291	0.5	1.3	0.8
Food/Beverage/Tobacco	H0FO	353	-62	-183	0.4	1.4	0.8
Gaming	H0AG	209	-31	-235	0.2	1.0	0.4
Healthcare	H0HL	326	-96	-194	0.4	1.1	0.7
Homebuilders/Real Estate	H0HB	245	-54	-206	0.2	1.2	0.6
Hotels	H0AH	191	-18	-198	0.4	1.0	0.6
Insurance	H0IN	355	-85	-195	0.4	1.1	0.7
Leisure	H0LE	340	62	-61	0.5	1.3	0.8
Metals/Mining	H0ME	342	-99	-175	0.2	1.2	0.6
Paper	H0PA	300	-84	-116	0.3	1.2	0.6
Publishing/Printing	H0PU	878	-2	192	0.7	2.0	1.2
Railroad	H0RA	287	-21	-55	0.3	2.6	0.6
Restaurants	H0RE	189	-26	-231	0.2	1.0	0.4
Services	H0SE	348	-34	-215	0.4	1.1	0.7
Steel	H0ST	369	-37	-123	0.3	1.8	0.8
Super Retail	H0SR	491	-18	-203	0.6	1.2	0.9
Technology	H0TY	243	-71	-220	0.2	1.1	0.5
Telecom	H0TC	466	22	-123	0.6	1.3	0.9
Transportation Ex Air/Rail	H0SH	710	-15	-216	0.6	1.4	0.9
Utilities	H0EL	228	-32	-160	0.2	1.0	0.4
US High Yield Index	H0A0	360	360	-173	0.4	1.1	0.7

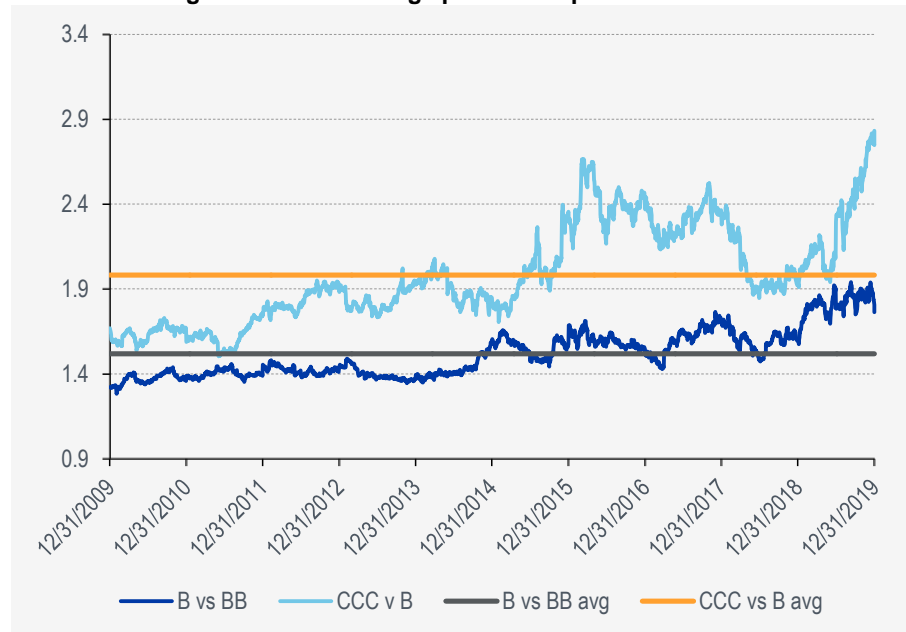
While all rating segments rallied, the CCC spread dropped back to its long term average – right at the 1,000bp distressed level.

Chart 32: US High Yield Index rating spreads



The CCC-B spread multiple has been on a sharp upward trajectory for most of the last year and closed out 2019 approaching the 3.0 mark.

Chart 33: US High Yield Index rating spread multiples



The 10 year annualized excess return continued to trend lower as the post-crisis rebound rally rolls out of the observation window. The current reading (+4.78%) is much closer to the Index's spread at the beginning of year index than 2019 excess return (533bp vs +9.15%).

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

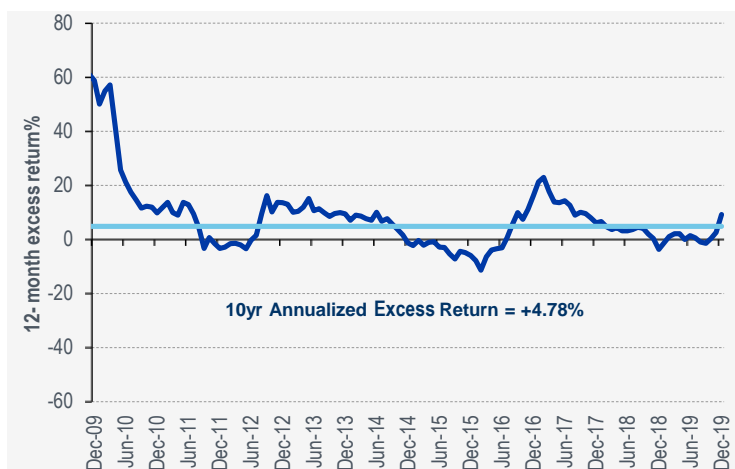


Table 18: US High Yield Excess Returns

10yr Ann. Excess Return	4.78
Current	9.15
Hi (Nov-09)	58.74
Lo (Feb-16)	-11.40
Std. Dev	11.88

European High Yield Indices

Unlike its US counterpart, European Currency HY did see notably better performance in the lower-quality segments with CCCs way ahead of the rest of the field for the quarter and year.

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

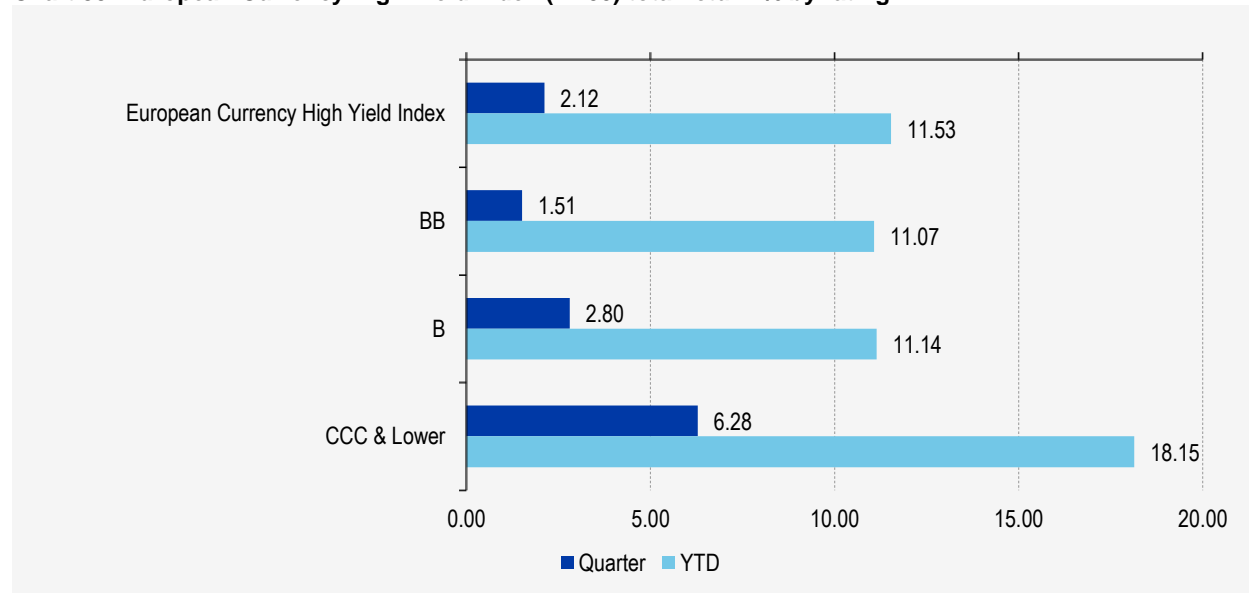


Chart 36: European Currency High Yield Index (HP00) total return % by sector

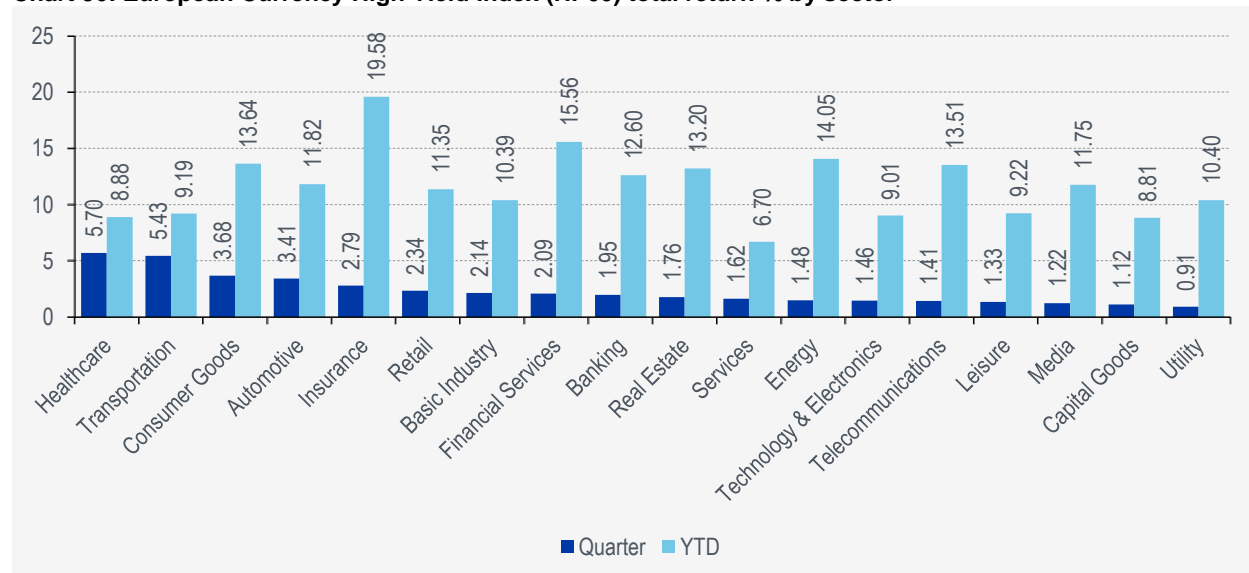


Chart 37: European high yield currency spreads

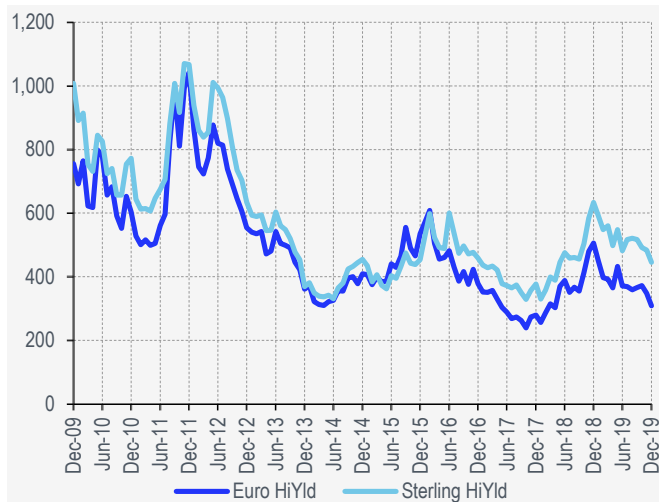
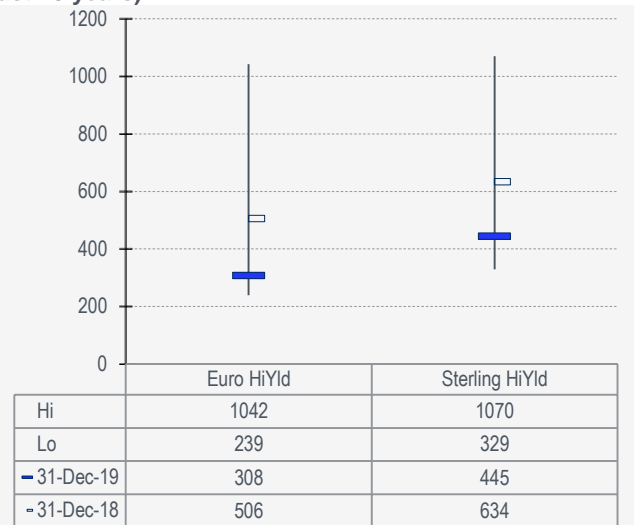


Chart 38: European high yield currency spread range (last 10 years)



While most other sectors ended the year closer to their 10 year lows, Transportation widened 120bp in Q4 (253bp YoY) to end 2019 at a 10 year 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

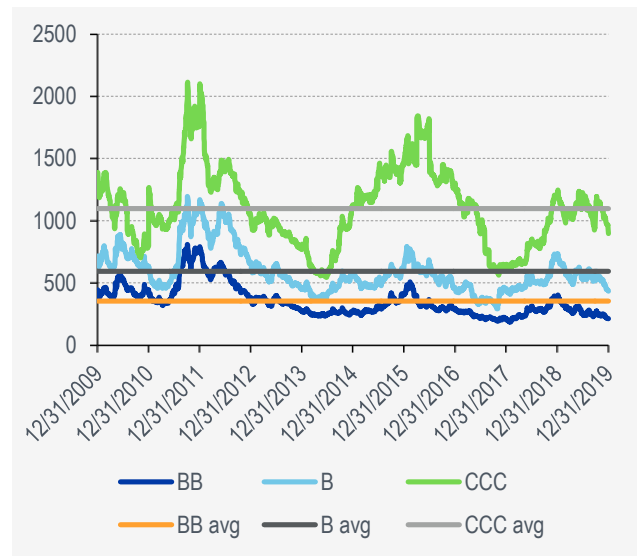


Chart 40: Euro High Yield Index rating spread multiples

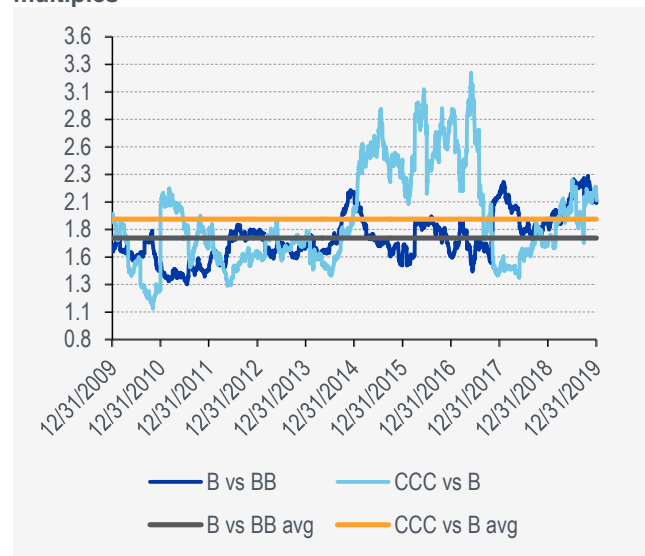


Chart 41: Sterling High Yield Index rating spreads

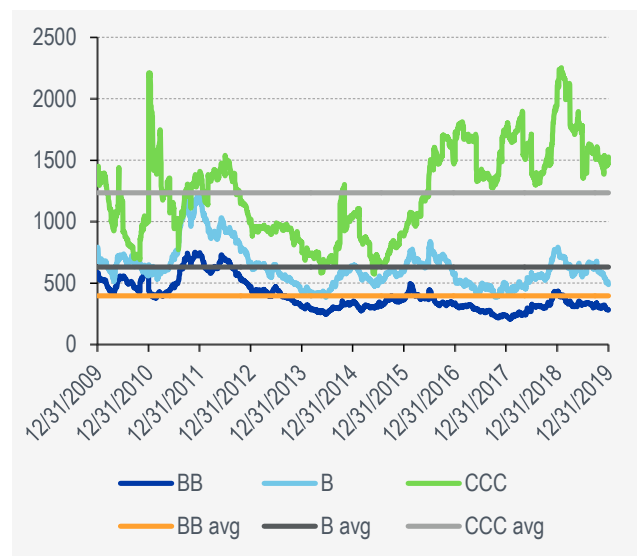
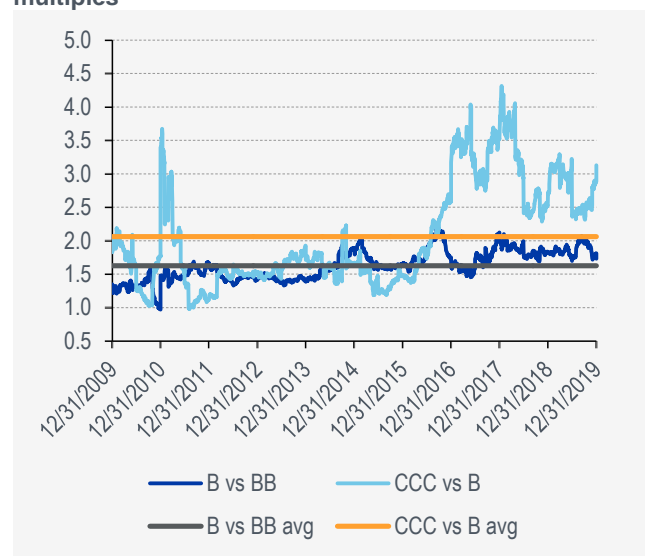


Chart 42: Sterling High Yield Index rating spread multiples



It will be two more quarters before the rebound rally from the financial crisis moves out of the 10 year observation window. That being the case, the annualized +5.82% excess return over the period is notably above the 461bp average spread.

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

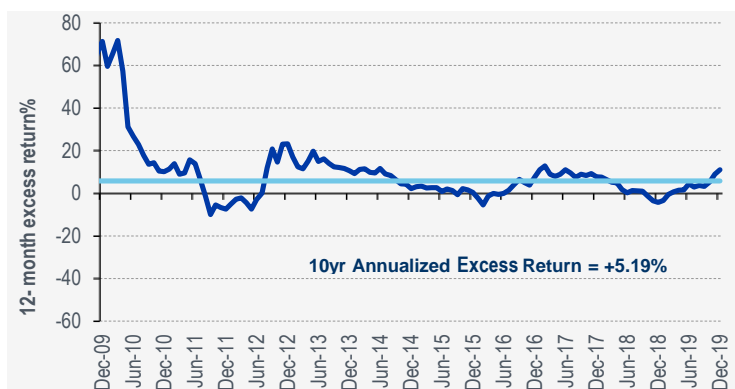


Table 20: Euro High Yield Excess Returns

10yr Ann. Excess Return	5.82
Current	11.06
Hi (Mar-10)	71.63
Lo (Sep-11)	-10.00
Std. Dev	13.95

Sterling's 2019 excess return is almost identical to that of its Euro counterpart (+11.33% v +11.06%, respectively), but the longer term standard deviation remains significantly higher for the GBP index (23.35 vs. 13.95).

Chart 44: Sterling Yield Index 12-month excess return

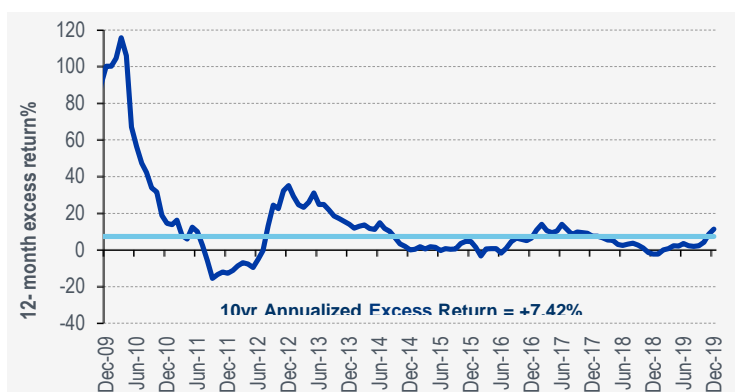


Table 21: Sterling High Yield Excess Returns

10yr Ann. Excess Return	7.42
Current	11.33
Hi (Mar-10)	115.74
Lo (Sep-11)	-15.49
Std. Dev	23.35

Emerging Markets

Overview

The composite EM index had its best year on record.

After slowing to a crawl in Q3 with a 0.58% USD return, the EM composite index gained 3.44% (USD terms) in Q4 to extend its string of positive quarterly returns to six. Impressively, other than the Q3 slowdown the index gained more than 3% every quarter this year. That adds up to a 12.59% full year return that is the best in the index's brief 7 year history. Unfortunately, even with the 2019 gains included, the index's annualized return since inception is a paltry 2.35%. On the bright side, that is triple what it was a year ago, so at least things are heading in a positive direction.

All EM risk factors pulled the indices in a positive direction for the quarter and year.

All of the emerging markets risk factors pulled the indices in a positive direction for both the quarter and the year. The only negatives across the four indices for those two periods were losses in the two external indices attributed to the sell-off in underlying benchmark developed government yield curves (U.S. Treasury curve +23bp; German Bund curve +39bp). That is in stark contrast to the prior year performances. In 2018 both external indices incurred negative excess returns versus underlying benchmark Treasuries/Bunds for Q4 and the full year. And the local indices both suffered currency losses for Q4 and full year, on top of which the local credit index had negative excess returns versus risk matched local EM governments.

Exhibit A: EM index return attributions – Q4 2019

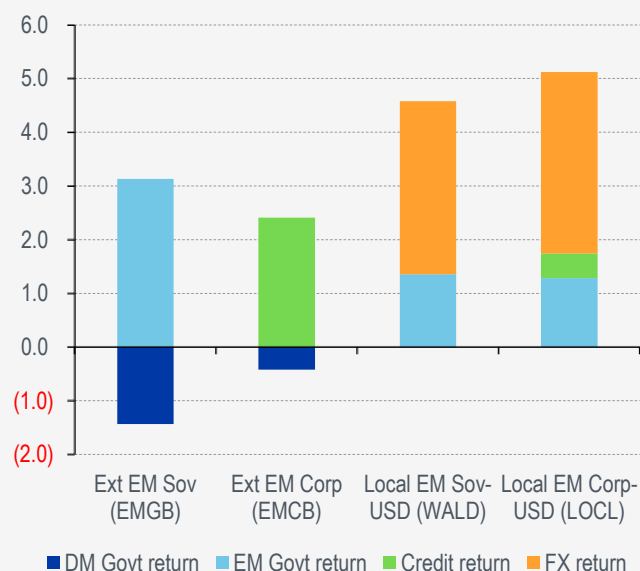
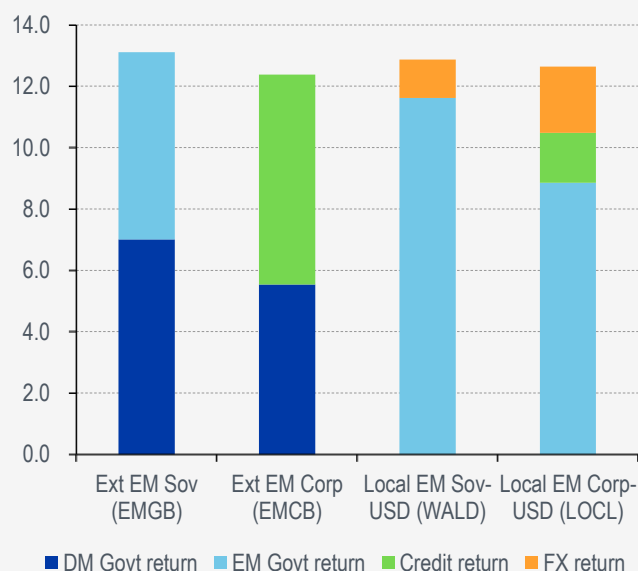


Exhibit B: EM index return attributions – FY 2019

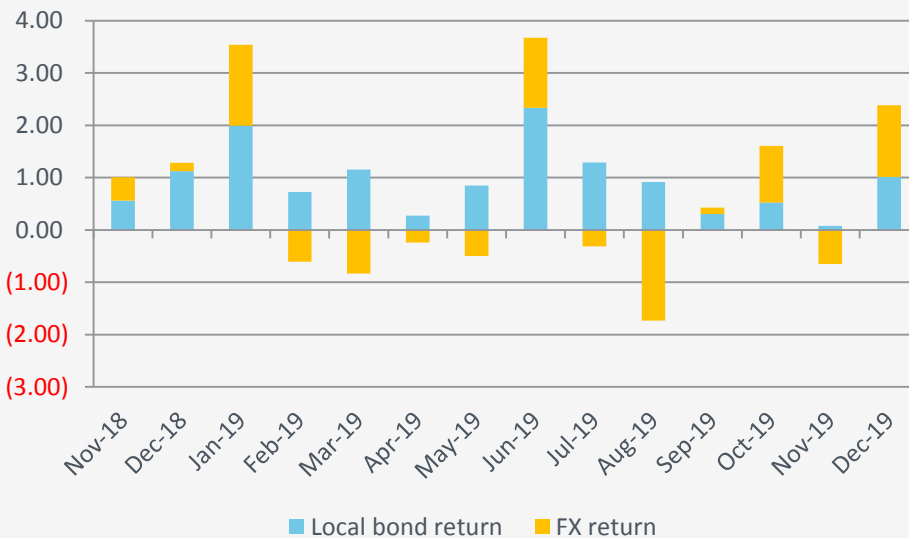


The composite EM index has posted 14 consecutive positive bond returns.

EM bonds have been on a 14 month long run of positive returns (Exhibit C). And in seven of the 14 months the currency markets pulled in the same direction. The index did suffer currency losses in the other seven months, but only twice was it enough to drag the index into the red when measured in USD terms: -0.82% in August 2019; -0.57% in November 2019. The frequency of currency losses over the last 14 months is not out of line with prior history. Over its life, the index has had positive currency returns in a little less than half of the observations (39 out of 84, or 46%). But the length of the run of positive bond returns is a little out of the ordinary.

Over its life the EM composite index has generated positive monthly returns in local currency terms three quarters of the time (63 out of 84 observations). This is easily the longest the index has gone without a negative bond return. Prior to this run, the longest the index had gone without a loss was the ten months from December 2016 to September 2017. It followed that run with two unimpressive 1% quarterly returns in Q4 2017 and Q1 2018 then suffered a 5.45% loss in Q2 2018.

Exhibit C: Composite EM Index¹ monthly USD total return by source



¹The EM Composite is a blend of the External Sovereign (EMGB), External Non-Sovereign (EMCB), Local Sovereign (WALD) and Local Non-Sovereign (LOCL) Indices.

There was a clear bias favoring lower rated credits in Q4.

A comparison of returns by rating across the four flagship Emerging Markets Indices shows two distinct trends in the Q4 performances. First, there was a clear bias favoring lower rated credits. With few exceptions, the returns within each of the four indices increased with each step down in rating. Of course, the CCC and lower

Local sovereign component stands head and shoulder above the crowd. That is entirely attributed to Argentina as it rebounded in December after the Senate approved an emergency economic package

The second observable Q4 trend was the fact that the external sovereign returns in each rating bucket, for the most part, were comparable to their external non-sovereign counterparts, and likewise for the two local indices. However, the local Sovereign and non-sovereign returns within each rating bucket were generally much higher than the corresponding external sovereign and non-sovereign returns for the same rating bucket.

Exhibit D: Emerging Markets Q4 2019 total returns in USD terms

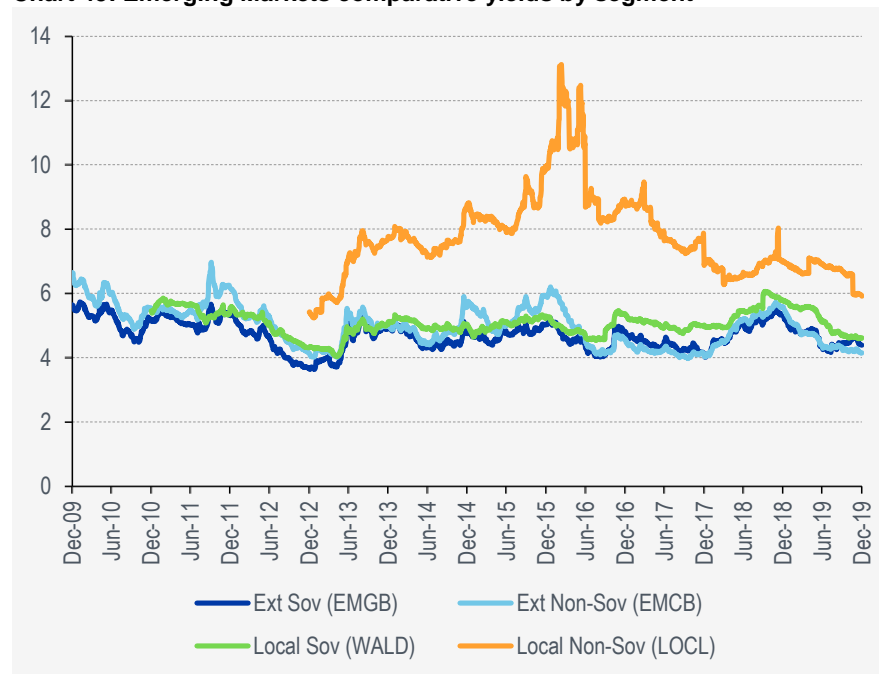
Composite Rating	External Sov (EMGB)	External Non-Sov (EMCB)	Local Sov (WALD)	Local Non-Sov (LOCL)
AAA		0.27	3.45	3.94
AA	0.93	0.71	1.87	5.66
A	0.78	0.70	3.35	2.85
BBB	1.93	1.87	5.11	5.70
BB	2.59	3.55	6.32	6.86
B	3.63	3.98	6.10	7.78
CCC and lower	2.86	11.82	63.34	4.70
Total	2.21	2.23	4.58	5.12

Three times as much external non-sovereign debt was downgraded as was upgraded in Q4 2018.

The External Non-Sovereign Index quarterly upgrade/downgrade ratio tumble to 0.327 in Q4 from 0.769 in Q3 as rating agencies downgraded three times as much debt as they upgraded (\$42bn vs. \$14bn). That is the fifth straight quarter that rating migrations were biased to the downside. At least the Q4 2019 result come on relatively light volume of \$55bn in total rating changes, versus a \$165bn quarterly average since 1999. Over that 21 year period there have been more quarters that were downwardly biased than the opposite with the downgrades exceeding upgrades in 46 out of 84 quarterly observations.

Yields fell across all segments of the EM debt markets, both in Q4 and for 2019. For FY 2019 the drop in yield was 1% to 1.5%.

Chart 45: Emerging Markets comparative yields by segment



While 10 year Sharpe ratios were little changed QoQ, there were some notable changes in the 5 year rankings. EMEA corporates have now pulled away into the first slot, while Financial and BB corporates are next-best. Financials corporates are also among the top-ranked ratios over the longer 10 year period.

Table 22: Five- and Ten-Year Sharpe Ratios (as of 31 Dec 2019)

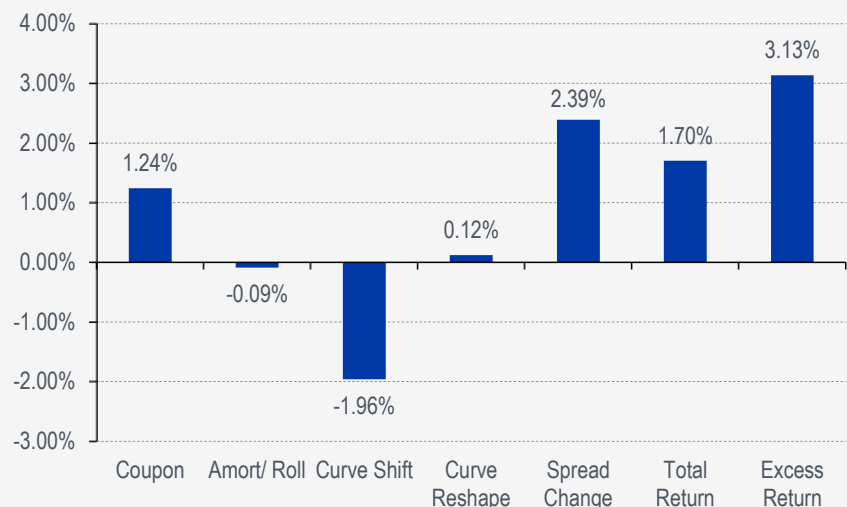
Index	Ticker	Ann. Total Return		Ann. Std. Dev.		Sharpe Ratio		Chg vs Prior Qtr	
		5yr	10yr	5yr	10yr	5yr	10yr	5yr	10yr
3-Month Treasury Bill	G001	1.07	0.58	0.26	0.23				
US Treasury	G0Q0	2.41	3.21	3.90	3.70	0.10	0.21	-0.05	0.01
External DM+EM Sov									
BBB & Lower	IP00	5.47	6.62	5.57	6.15	0.23	0.28	0.02	0.00
BB & Lower	IG00	6.10	7.33	7.53	7.80	0.20	0.25	0.07	0.00
BBB-B	IQ00	5.28	6.51	5.47	6.09	0.22	0.28	0.02	0.00
USD DM+EM External Sov									
BBB & Lower	IGOV	5.73	6.75	5.73	6.40	0.24	0.28	0.03	0.00
BBB	I5GV	5.45	6.32	5.65	6.25	0.22	0.27	0.00	0.00
BB	I1GV	8.10	9.00	5.67	6.16	0.35	0.39	0.01	0.00
B	I2GV	5.20	6.59	8.59	9.95	0.15	0.18	0.08	0.01
CCC & Lower	I3GV	10.13	8.31	18.77	16.85	0.16	0.15	0.03	-0.02
BB-B	I4GV	6.32	7.27	6.92	7.49	0.22	0.26	0.07	0.00
BB & Lower	IGD0	6.48	7.29	7.37	7.80	0.22	0.25	0.07	0.00
BBB-B	IQD0	5.57	6.70	5.63	6.35	0.23	0.28	0.02	0.00
EM External Sovereigns	EMGB	5.32	6.38	4.90	5.52	0.25	0.30	0.02	0.00
EM External Corporates									
EM Corp+	EMCB	5.60	6.19	3.60	4.60	0.36	0.35	0.08	0.00
EM Liquid Corp+	EMCL	6.10	6.42	3.86	4.89	0.37	0.34	0.08	0.00
AAA-A	EM1R	4.26	5.20	2.88	3.15	0.32	0.42	-0.03	0.00
BBB	EM2R	5.47	6.20	4.22	5.18	0.30	0.31	0.05	-0.01
BB & Lower	EMHY	8.19	7.88	6.40	8.20	0.32	0.26	0.12	0.00
BB	EM3R	8.04	8.04	5.05	7.00	0.39	0.31	0.10	0.00
B & Lower	EM4R	8.49	7.53	9.67	10.75	0.23	0.20	0.11	0.01
BBB-BB	EMXO	6.52	6.88	4.32	5.64	0.36	0.32	0.07	-0.01
Financial	EMFL	5.43	6.07	3.04	4.14	0.41	0.38	0.05	-0.01
Non-Financial	EMNF	5.97	6.37	4.63	6.15	0.30	0.27	0.07	0.00
Public Sector	EMPU	6.40	6.52	3.92	4.65	0.39	0.36	0.08	0.00
Private Sector	EMPV	5.82	6.34	3.94	5.49	0.34	0.30	0.07	0.00
Latin America	EMLL	6.40	6.82	6.89	7.02	0.23	0.26	0.06	0.00
EMEA	EMEL	7.29	6.80	3.68	4.98	0.48	0.36	0.16	0.01
Asia	EMAL	4.81	5.80	2.87	4.11	0.37	0.36	0.00	-0.01
Global HY & EM	HA00	5.75	7.31	4.47	5.29	0.30	0.36	0.04	-0.01
Global High Yield	HW00	6.32	7.72	4.94	5.84	0.30	0.35	0.05	-0.01

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

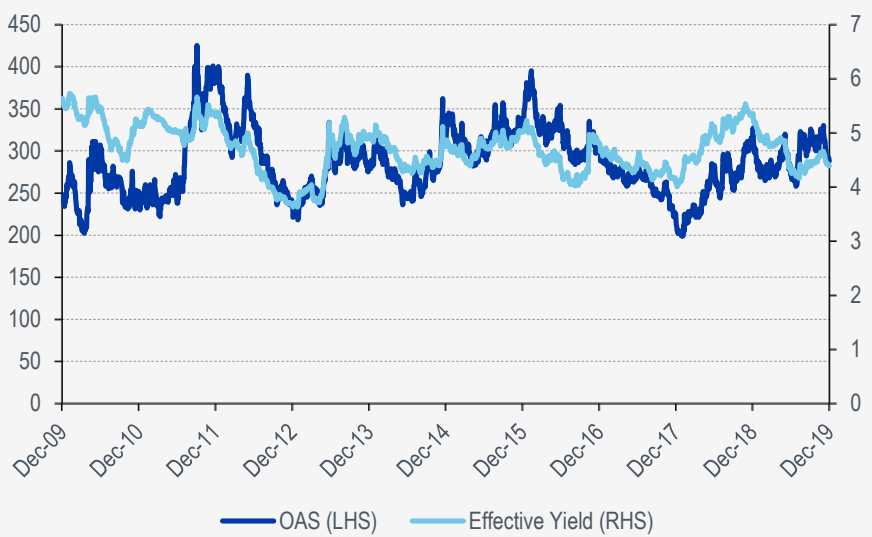
The good news in Q4 was a strong credit rally that made spread change return the single biggest contributor to performance. The bad news was rising benchmark government curves erasing most of those gains.

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



At 288bp, the index spread ended the year at its 10 year mean (286bp).

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



The FY 2019 excess return was a fairly impressive +6.10% – roughly twice the average index spread over the year (293bp).

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



Table 3: External EM Sovereign Index (EMGB) quarterly returns; current stats

Country	Total Return	Excess Return	Effective Yield	OAS	% weight
Albania	1.83	3.36	1.82	224	0.06
Angola	6.55	7.55	7.37	542	0.79
Argentina	21.24	22.06	22.93	2,166	2.96
Armenia	2.14	2.87	3.75	196	0.10
Azerbaijan	2.29	3.19	3.37	154	0.25
Bahamas	5.62	6.26	4.29	249	0.14
Bahrain	5.21	5.86	4.02	221	1.52
Barbados	0.00	0.00	6.93	498	0.05
Belarus	2.05	2.46	5.08	333	0.20
Belize	2.92	3.92	11.03	871	0.03
Benin	2.76	4.27	4.83	529	0.05
Bolivia	4.21	4.34	3.92	221	0.19
Brazil	1.82	3.11	3.60	174	3.46
Bulgaria	(0.28)	1.85	0.20	60	0.78
Cameroon	4.62	4.59	6.55	485	0.08
Chile	(1.71)	0.80	1.66	76	1.31
China	(0.31)	1.05	1.71	46	1.41
Colombia	0.61	2.41	3.29	141	2.83
Costa Rica	7.05	8.49	5.67	366	0.52
Croatia	(0.53)	0.93	1.13	78	1.35
Czech Republic	(0.33)	0.15	(0.18)	44	0.63
Dominican Republic	3.20	4.23	4.59	267	1.36
Ecuador	(5.33)	(5.20)	10.14	841	1.89
Egypt	4.20	5.31	5.75	421	2.81
El Salvador	5.53	6.70	5.74	380	0.67
Ethiopia	5.11	5.16	4.83	312	0.10
Gabon	7.61	7.52	5.34	366	0.21
Georgia	1.23	0.68	2.70	109	0.05
Ghana	3.34	4.15	7.14	525	0.63
Guatemala	2.18	3.26	3.99	211	0.41
Honduras	1.81	1.76	4.30	257	0.12
Hong Kong	(0.03)	(0.05)	2.05	37	0.09
Hungary	0.48	1.11	2.00	63	1.26

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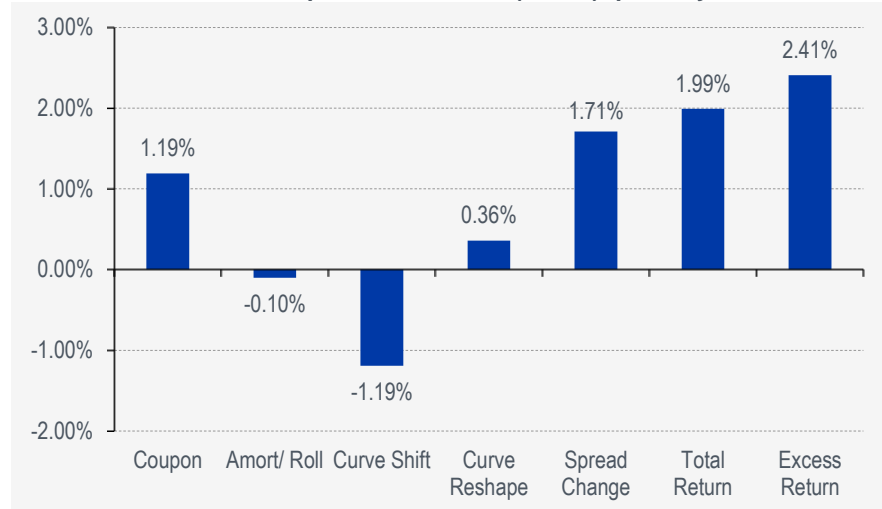
Table 3: External EM Sovereign Index (EMGB) quarterly returns; current stats

Country	Total Return	Excess Return	Effective Yield	OAS	% weight
Indonesia	1.06	2.43	2.79	120	7.09
Iraq	1.75	1.58	6.28	459	0.34
Israel	(1.01)	1.77	1.54	68	1.51
Ivory Coast	4.00	5.93	5.55	480	0.70
Jamaica	3.84	5.60	4.70	265	0.61
Jordan	3.65	4.71	5.48	355	0.29
Kazakhstan	2.30	4.02	2.35	91	0.95
Kenya	5.27	5.99	6.02	417	0.60
Kuwait	0.72	0.93	2.23	52	0.76
Lebanon	(28.73)	(28.45)	28.02	2,627	1.04
Macedonia	(0.43)	0.58	1.08	162	0.16
Malaysia	(0.18)	1.01	2.55	66	0.37
Mexico	2.12	4.52	2.87	147	6.47
Mongolia	3.33	2.99	4.44	283	0.28
Montenegro	0.22	2.39	2.30	264	0.11
Morocco	1.94	3.27	1.96	118	0.44
Namibia	3.13	3.08	4.08	239	0.12
Nigeria	1.33	2.46	6.79	486	1.03
Oman	5.38	6.08	4.86	301	2.10
Pakistan	5.16	5.26	5.42	371	0.51
Panama	0.79	2.65	3.00	99	1.81
Papua N.Guinea	2.02	2.80	7.45	560	0.05
Paraguay	2.14	4.07	3.62	158	0.48
Peru	0.58	2.78	2.47	86	1.42
Philippines	(0.48)	1.15	2.56	71	2.85
Poland	(0.71)	1.08	0.58	47	4.09
Qatar	1.07	2.78	2.83	85	4.27
Romania	(0.76)	2.20	1.95	166	2.93
Russia	4.47	6.14	3.02	135	3.98
Rwanda	0.33	0.01	4.48	287	0.04
Saudi Arabia	0.58	2.25	2.91	107	6.39
Senegal	4.35	5.92	4.91	361	0.39
Serbia	0.05	1.31	1.65	97	0.32
South Africa	1.22	2.64	4.72	282	1.90
South Korea	(0.68)	0.79	1.99	49	0.71
Sri Lanka	1.60	1.84	6.79	506	1.27
Suriname	(9.32)	(9.06)	14.28	1,251	0.04
Trinidad & Tobago	3.62	3.87	3.19	145	0.15
Tunisia	4.52	5.50	6.36	622	0.30
Turkey	4.24	5.11	5.33	372	6.26
UAE	0.72	1.95	2.66	77	2.99
Ukraine	6.26	7.13	4.86	316	1.87
Uruguay	1.78	4.17	3.50	139	1.36
Uzbekistan	2.40	2.92	3.55	179	0.10
Vietnam	0.62	0.71	2.82	111	0.10
Zambia	(0.30)	(0.40)	19.02	1,734	0.19
Total	1.70	3.13	4.39	288	100.00

Emerging Markets External Non-Sovereign

The spread factor made the largest positive contribution to performance in Q4. The negative impact of a higher yield curve (-1.19%) was partially moderated by the twist factor (0.36%).

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



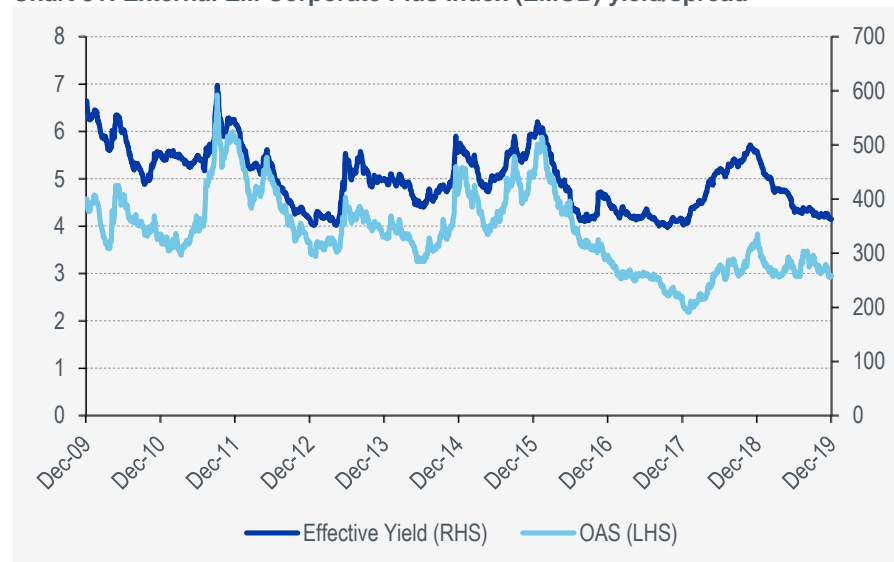
Roles reversed in Q4, with High Yield bouncing from worst in Q3, and LatAm rising from last to the top of the regional rankings.

Chart 50: External EM Non-Sovereign Index returns



The index spread rallied 70bp during 2019 – 27bp of that in Q4. At 4.15%, the index yield ended the year just 18bp over the 10 year low.

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



The 10 year annualized excess return is a respectable +3.30%. The +6.84% 2019 result is the third-best year over that period.

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	19.98	19.90	18.09	1,672	1.45
Azerbaijan	3.45	3.82	3.57	182	0.27
Bahrain	3.83	3.96	4.41	270	0.28
Barbados	(1.44)	(1.50)	7.21	552	0.07
Belarus	2.37	2.12	5.50	387	0.05
Brazil	2.45	2.97	4.07	232	8.22
Bulgaria	0.63	1.60	1.02	157	0.07
Cambodia	2.67	2.13	(5.39)	-700	0.02
Chile	(0.42)	0.54	3.79	196	2.90
China	1.63	1.74	4.20	262	29.33
Colombia	1.26	1.77	3.82	202	1.45
Congo, Demc Rep.	1.24	0.71	4.65	308	0.04
Costa Rica	3.21	3.44	5.45	369	0.13
Croatia	1.88	1.48	2.41	82	0.04
Czech Republic	0.18	1.49	1.50	180	1.01
Dominican Republic	3.58	3.48	5.16	344	0.06
Ecuador	1.79	2.19	10.01	808	0.03
El Salvador	2.25	1.79	4.75	312	0.04
Georgia	3.32	3.01	4.63	301	0.11
Ghana	(8.39)	(8.59)	9.52	783	0.12
Guatemala	1.54	1.26	4.29	258	0.14
Hong Kong	0.68	1.11	3.39	199	5.01
Hungary	0.18	0.92	0.91	146	0.11
India	0.83	1.01	3.99	235	4.18
Indonesia	1.28	2.39	4.13	230	2.84
Israel	12.30	12.97	4.83	366	1.61
Jamaica	13.21	12.82	32.13	3,055	0.19
Kazakhstan	2.25	3.52	5.04	311	0.82
Kuwait	1.47	1.38	3.20	146	0.47
Macau	1.21	1.47	3.41	167	0.40
Malaysia	0.35	0.76	3.03	127	0.95
Mauritius	4.84	4.36	7.48	591	0.05
Mexico	2.82	4.00	4.24	272	9.22
Mongolia	1.47	1.20	9.01	738	0.08
Morocco	3.04	3.77	3.53	169	0.20
Nigeria	3.50	3.27	5.73	406	0.19
Oman	4.96	5.14	4.57	284	0.31
Panama	1.23	2.16	3.58	173	0.46
Paraguay	1.34	1.30	3.76	195	0.02
Peru	1.74	2.66	3.85	196	1.75
Philippines	0.70	0.58	2.70	104	0.43
Poland	(0.49)	0.97	0.78	98	0.52
Qatar	1.20	1.25	3.30	151	1.02
Romania	0.15	1.23	1.65	215	0.22
Russia	2.13	2.16	2.93	157	4.19
Saudi Arabia	0.87	2.28	3.42	150	1.64
Singapore	0.71	1.21	3.38	184	2.06
South Africa	1.01	1.21	4.67	317	1.34
South Korea	0.48	0.52	2.38	84	4.80
Taiwan	0.84	1.00	2.94	123	0.19
Thailand	(0.29)	0.49	3.12	128	0.93
Togo	1.89	1.76	6.33	467	0.03
Trinidad & Tobago	2.56	3.29	6.15	430	0.12
Turkey	4.19	3.91	5.67	405	2.10
UAE	1.01	1.64	3.21	164	4.69
Ukraine	2.87	3.04	6.37	511	0.59
Uruguay	2.45	1.97	8.26	669	0.02
Uzbekistan	0.00	0.00	5.23	352	0.02
Vietnam	2.52	2.59	4.93	321	0.06
Zambia	5.96	5.75	6.05	439	0.33
Total	1.99	2.41	4.15	258	100.00

Emerging Markets Local Sovereign

The index yield has been falling for most of the 2019 and is now just over the 4.5% mark – nearly as low as we have seen in over three years.

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



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

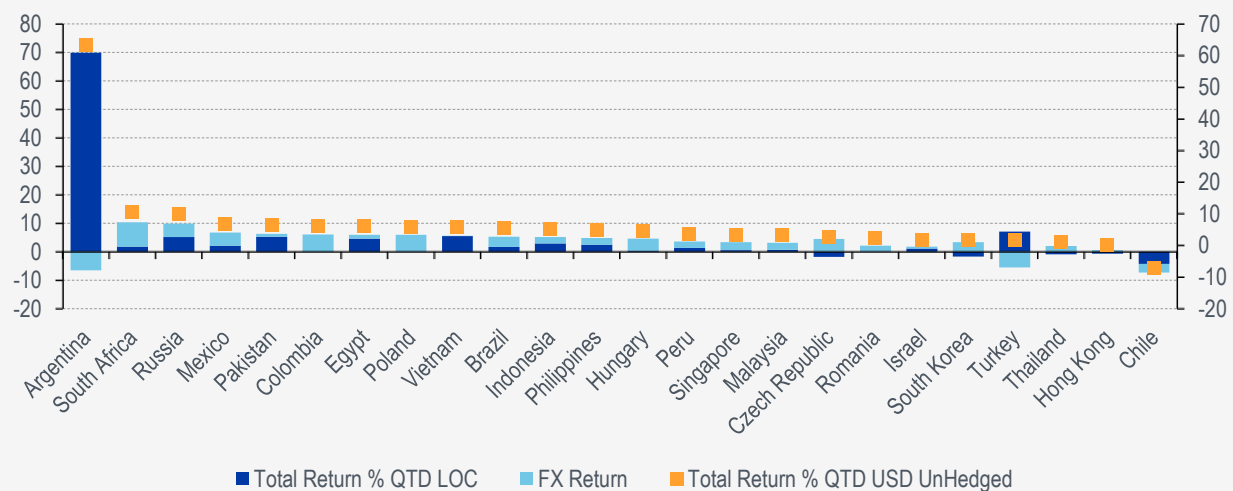


Table 25: Diversified Local EM Sovereign Index (WALD) quarterly returns; current stats

Country	Local total return%	FX return%	USD total return%	Effective Yield	% weight
Argentina	69.81	(6.46)	63.34	65.53	0.14
Brazil	1.75	3.61	5.35	5.43	10.00
Chile	(4.24)	(3.02)	(7.26)	2.86	0.64
Colombia	0.05	6.01	6.05	5.56	2.83
Czech Republic	(1.74)	4.51	2.77	1.72	2.55
Egypt	4.62	1.41	6.03	14.20	2.36
Hong Kong	(0.64)	0.61	(0.03)	1.88	0.59
Hungary	0.32	4.30	4.63	0.93	2.13
Indonesia	2.90	2.32	5.22	6.90	7.75
Israel	1.13	0.64	1.77	0.76	2.90
Malaysia	0.75	2.38	3.13	3.35	8.74
Mexico	2.12	4.65	6.77	6.96	8.14
Pakistan	5.35	0.99	6.34	12.07	0.56
Peru	1.36	2.23	3.59	4.40	1.87
Philippines	2.49	2.40	4.89	4.31	4.15
Poland	0.13	5.87	6.00	1.74	5.52
Romania	0.18	2.03	2.21	3.80	1.82
Russia	5.24	4.70	9.94	5.92	5.05
Singapore	0.58	2.86	3.45	1.69	4.38
South Africa	1.82	8.59	10.41	9.16	5.45
South Korea	(1.62)	3.38	1.76	1.59	10.00
Thailand	(0.93)	2.09	1.16	1.61	8.02
Turkey	7.09	(5.48)	1.61	11.38	2.39
Vietnam	5.50	0.13	5.63	2.84	2.03
Total	1.35	3.23	4.58	4.62	100.00

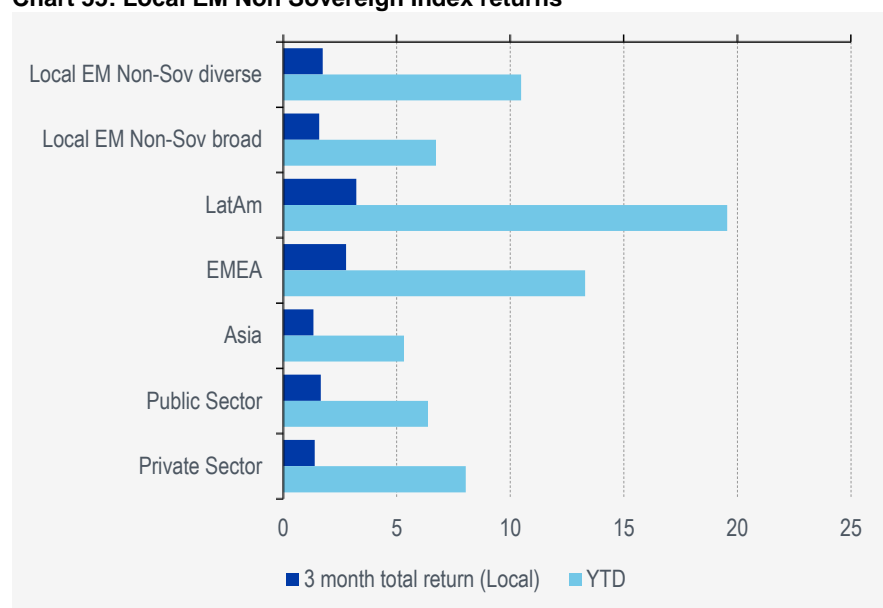
Table 26: Diversified Local EM IL Sovereign Index (WILD) quarterly returns; current stats

Country	Local total return%	FX return%	USD total return%	Effective Yield	% weight
Argentina	73.80	(6.61)	67.19	54.12	2.57
Brazil	1.50	3.60	5.10	1.46	20.00
Chile	(2.41)	(3.08)	(5.49)	0.38	9.06
Colombia	1.15	6.07	7.22	1.89	8.83
Israel	1.10	0.64	1.73	(0.46)	15.76
Mexico	1.84	4.64	6.47	3.49	20.00
South Africa	(1.77)	8.28	6.52	3.65	9.84
South Korea	(0.72)	3.41	2.69	0.78	1.66
Thailand	0.04	2.11	2.15	1.58	1.78
Turkey	6.49	(5.45)	1.04	3.03	10.51
Total	2.36	2.29	4.64	3.23	100.00

Emerging Markets Local Non Sovereign

LatAm currencies delivered the best performance in both Q4 and 2019, and EMEA was next-best in both cases.

Chart 55: Local EM Non Sovereign Index returns



The non-sovereign index yield has been declining fairly steadily along with underlying yield curves for most of 2019. The yield ended the year at 5.91% closing in on the all-time low of 5.23%, set early in the index's seven-year history.

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



The FY 2019 excess return is the best 12-month result the index has seen in about a year and a half.

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

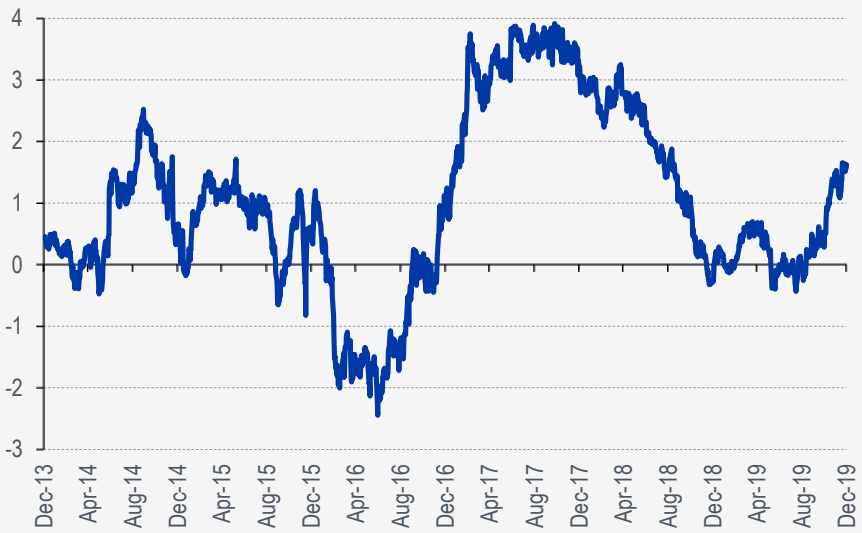


Table 27: Diversified Local EM Non-Sovereign Index (LOCL) quarterly returns; current stats

Currency	Total Return	Excess Return	Effective Yield	OAS	% weight
Brazilian Real	4.49	1.36	7.08	44	2.00
Chinese Renminbi (offshore)	0.80	(0.03)	4.79	206	5.03
Chinese Renminbi (inshore)	1.63	0.46	3.32	42	4.97
Colombian Peso	1.38	0.84	6.48	122	9.64
Czech Koruna	0.14	0.77	2.90	105	1.85
Hong Kong Dollar	(0.15)	0.90	3.20	134	10.00
Indian Rupee	0.37	(0.91)	8.11	196.00	9.35
Indonesia Rupiah*	3.69	1.64	8.52	317	2.45
Malaysian Ringgit	0.97	0.15	4.32	81	4.57
Mexican Peso	3.65	1.83	9.10	218	10.00
Peru Nuevo sol	1.65	(0.28)	5.09	189	7.83
Russian Ruble	3.27	(0.29)	6.67	104	10.00
Singapore Dollar	1.24	0.67	2.71	101	10.00
South African Rand	2.92	0.70	8.92	95	10.00
Turkish Lira	5.10	0.44	12.93	242	0.30
Thailand Baht	0.41	(0.01)	1.23	0	2.00
Total	1.75	0.46	5.91	138	100.00

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	0.59%	-0.21%	-1.84%	0.16%	0.47%	-0.03%	0.01%	-0.85%	0.58%
W0G1	0.46%	-0.25%	-2.07%	0.10%	0.04%	0.00%	0.00%	-1.72%	0.06%
G0BQ	0.56%	-0.25%	-2.00%	0.15%	0.52%	0.00%	0.01%	-1.02%	0.62%
G0BL	0.79%	-0.03%	-0.97%	0.38%	0.33%	-0.23%	0.03%	0.31%	0.48%
G0BC	0.80%	-0.21%	-1.82%	0.16%	1.67%	0.00%	0.02%	0.62%	1.94%
US00	0.76%	-0.11%	-1.41%	0.26%	0.66%	-0.07%	0.02%	0.11%	0.78%
B0A0	0.73%	-0.16%	-1.62%	0.20%	0.78%	0.00%	0.01%	-0.06%	0.88%
G0Q0	0.58%	-0.14%	-1.57%	0.23%	0.00%	0.00%	0.00%	-0.89%	-0.03%
G0P0	0.71%	-0.24%	-0.97%	0.29%	0.04%	0.00%	0.04%	-0.13%	0.11%
C0A0	0.93%	-0.18%	-1.77%	0.14%	1.99%	0.00%	0.02%	1.15%	2.26%
C0A1	0.76%	-0.11%	-2.55%	-0.10%	1.80%	0.00%	0.04%	-0.17%	1.93%
C0A2	0.76%	-0.16%	-1.72%	0.17%	1.10%	0.00%	0.02%	0.16%	1.22%
C0A3	0.86%	-0.17%	-1.78%	0.14%	1.68%	0.00%	0.02%	0.75%	1.88%
C0A4	1.03%	-0.18%	-1.74%	0.14%	2.40%	0.00%	0.03%	1.67%	2.76%
M0A0	0.87%	0.03%	-0.80%	0.43%	0.38%	-0.31%	0.04%	0.66%	0.55%
R0A0	0.73%	-0.05%	-0.50%	0.18%	0.04%	-0.02%	0.00%	0.37%	0.04%
CMBS	0.85%	-0.08%	-1.16%	0.27%	-0.20%	-0.01%	0.00%	-0.32%	-0.03%
PE00	0.48%	-0.38%	-2.94%	0.11%	0.40%	0.00%	0.00%	-2.34%	0.50%
EMU0	0.44%	-0.38%	-2.77%	0.13%	0.40%	0.00%	0.00%	-2.18%	0.50%
EG00	0.50%	-0.45%	-3.18%	0.06%	0.17%	0.00%	0.00%	-2.90%	0.25%
EQ00	0.31%	-0.30%	-2.79%	0.14%	0.31%	0.00%	0.00%	-2.32%	0.37%
EP00	0.14%	-0.16%	-2.00%	0.28%	0.17%	0.00%	0.00%	-1.57%	0.22%
ER00	0.43%	-0.28%	-2.01%	0.26%	1.13%	0.00%	0.00%	-0.46%	1.36%
ER10	0.35%	-0.28%	-2.72%	0.07%	1.24%	0.00%	0.00%	-1.33%	1.33%
ER20	0.38%	-0.34%	-1.89%	0.27%	0.79%	0.00%	0.00%	-0.79%	0.92%
ER30	0.37%	-0.27%	-2.10%	0.25%	1.04%	0.00%	0.00%	-0.70%	1.22%
ER40	0.48%	-0.27%	-1.95%	0.27%	1.27%	0.00%	0.00%	-0.20%	1.56%
EMUL	0.44%	-0.38%	-2.78%	0.13%	0.39%	0.00%	0.00%	-2.20%	0.50%
UK00	0.65%	-0.35%	-3.77%	-0.03%	0.43%	0.00%	0.00%	-3.06%	0.52%
G0L0	0.58%	-0.36%	-4.30%	-0.05%	-0.02%	0.00%	0.00%	-4.15%	-0.03%
UQ00	0.54%	-0.28%	-2.04%	0.09%	0.02%	0.00%	0.00%	-1.67%	0.10%
UC00	0.90%	-0.32%	-2.79%	0.00%	1.81%	0.00%	0.00%	-0.40%	2.16%
UC10	0.76%	-0.42%	-2.71%	0.10%	0.79%	0.00%	0.00%	-1.47%	0.97%
UC20	0.67%	-0.24%	-2.76%	0.01%	0.90%	0.00%	0.00%	-1.42%	1.11%
UC30	0.83%	-0.30%	-3.17%	-0.05%	1.73%	0.00%	0.00%	-0.95%	2.02%
UC40	1.02%	-0.35%	-2.51%	0.02%	2.19%	0.00%	0.01%	0.38%	2.66%
G0M0	0.41%	-0.50%	-3.84%	0.09%	0.00%	0.00%	0.00%	-3.83%	-0.01%
G0W0	0.55%	-0.57%	-2.21%	-0.14%	0.00%	0.00%	0.00%	-2.35%	-0.01%
G0S0	0.40%	-0.49%	-3.34%	0.06%	0.06%	0.00%	0.00%	-3.31%	0.04%
HA00	1.38%	-0.10%	-1.22%	0.27%	1.98%	0.00%	0.08%	2.39%	2.99%
HW00	1.49%	-0.09%	-0.83%	0.34%	1.73%	0.00%	0.13%	2.78%	2.92%
HOA0	1.57%	-0.10%	-0.71%	0.30%	1.34%	0.00%	0.20%	2.61%	2.57%
HP00	1.04%	-0.20%	-1.22%	0.29%	2.20%	0.00%	0.01%	2.12%	3.12%
HE00	0.98%	-0.21%	-1.24%	0.31%	2.14%	0.00%	0.01%	1.98%	3.02%
HL00	1.47%	-0.09%	-1.09%	0.14%	2.68%	0.00%	0.05%	3.17%	3.95%
HWP0	1.25%	-0.16%	-1.04%	0.33%	2.05%	0.00%	0.06%	2.48%	3.08%
HC00	1.38%	-0.10%	-1.04%	-0.02%	0.85%	0.00%	0.00%	1.07%	1.74%
HWC0	1.58%	-0.11%	-0.67%	0.30%	1.23%	0.00%	0.17%	2.50%	2.44%
WSOV	0.56%	-0.22%	-1.77%	0.09%	0.05%	0.00%	0.00%	-1.30%	0.06%
IP00	1.38%	-0.05%	-1.89%	0.12%	2.55%	0.00%	0.00%	2.12%	3.46%
IGOV	1.47%	-0.04%	-1.75%	0.12%	2.39%	0.00%	0.00%	2.20%	3.32%
WSAV	0.46%	-0.25%	-2.08%	0.10%	0.05%	0.00%	0.00%	-1.72%	0.07%
WSBV	1.18%	-0.06%	0.07%	-0.02%	0.03%	0.00%	0.00%	1.20%	0.00%
LOCL	1.59%	0.04%	-0.01%	0.06%	0.07%	0.00%	0.00%	1.75%	0.46%
EMGB	1.24%	-0.09%	-1.96%	0.12%	2.39%	0.00%	0.00%	1.70%	3.13%
EMCB	1.19%	-0.10%	-1.19%	0.36%	1.71%	0.00%	0.03%	1.99%	2.41%
EMCL	1.26%	-0.09%	-1.22%	0.34%	1.87%	0.00%	0.03%	2.19%	2.60%

Chart 58: US Treasury par coupon spline curve

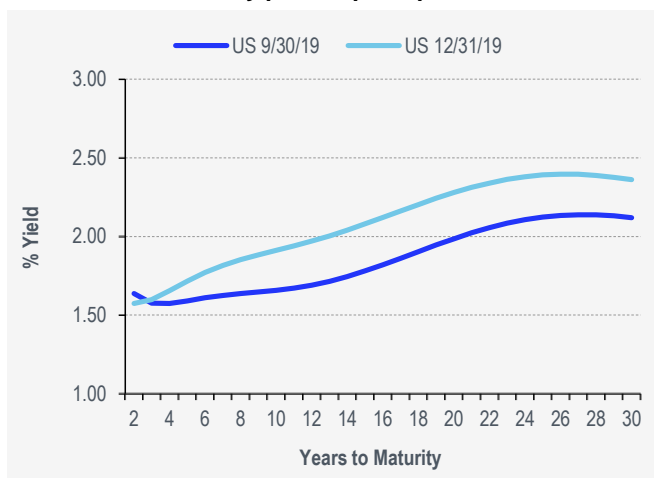


Chart 61: 3-month change in US Treasury curve

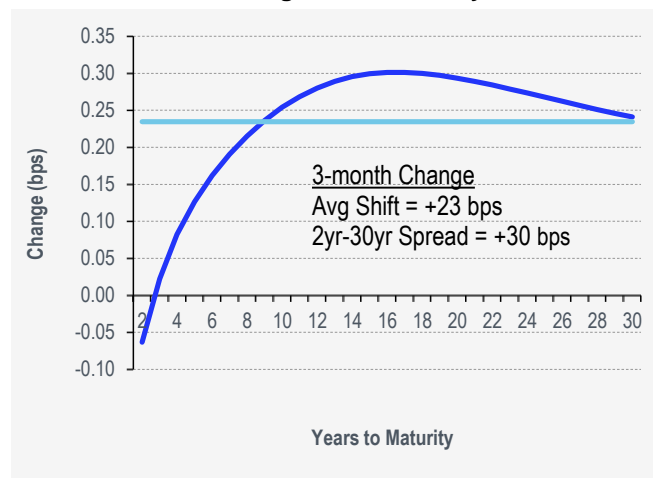


Chart 59: German par coupon spline curve

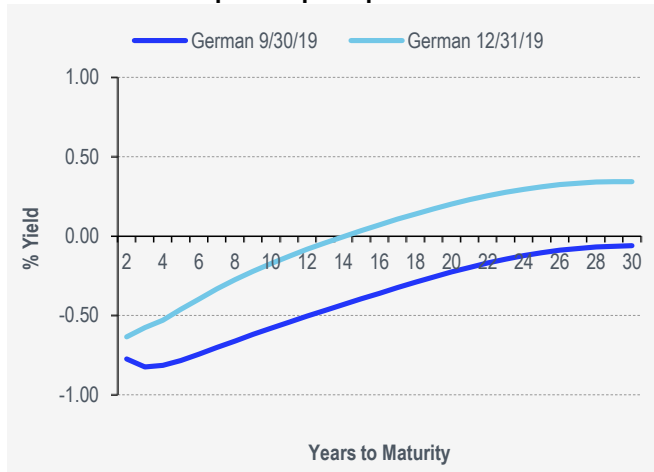


Chart 62: 3-month change in German curve

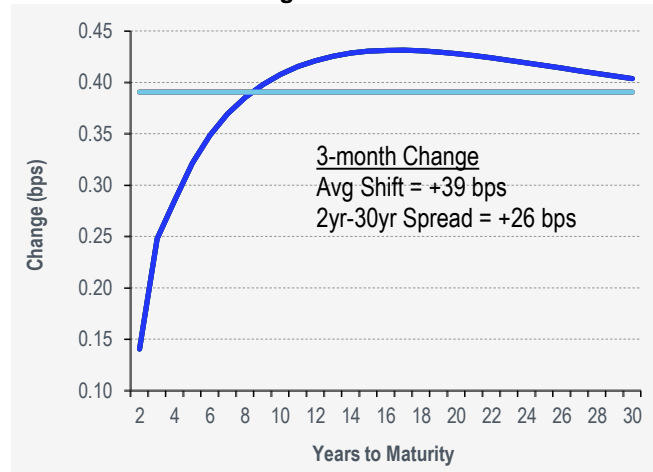


Chart 60: UK Gilt par coupon spline curve

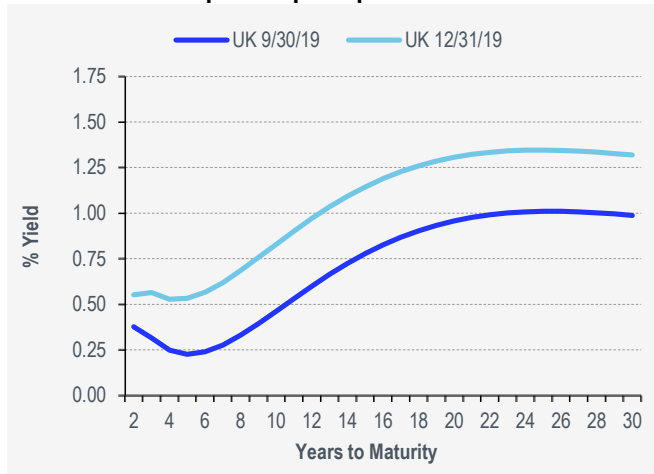


Chart 63: 3-month change in UK Gilt curve

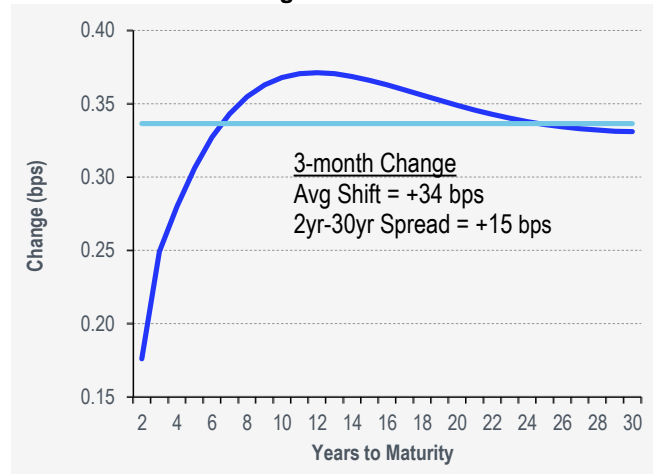


Chart 64: JGB par coupon spline curve



Chart 66: 3-month change in JGB curve

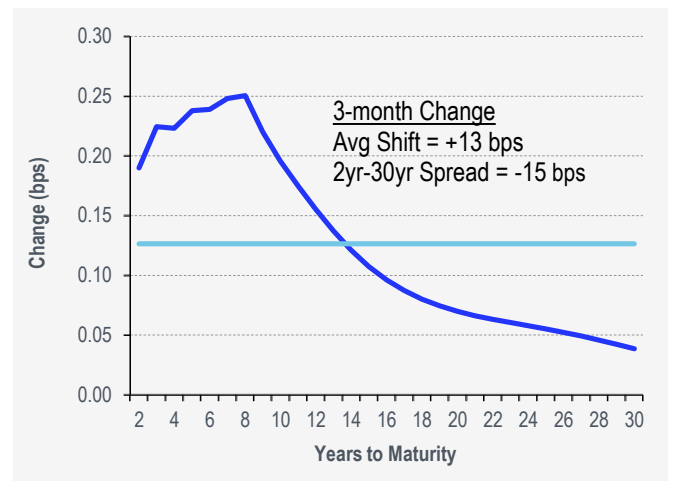
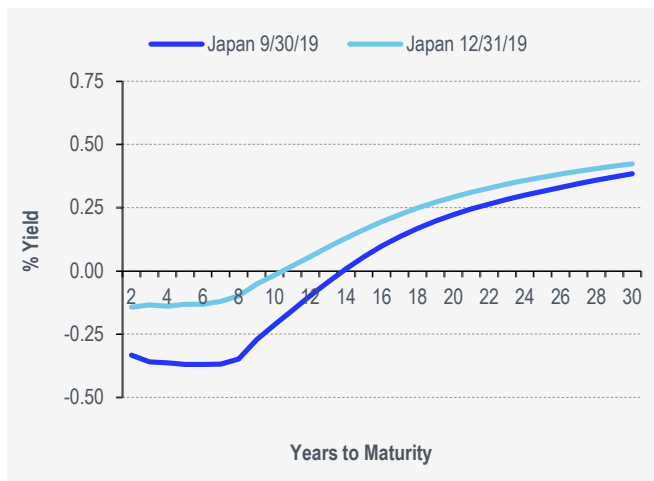


Chart 65: Canada par coupon spline curve

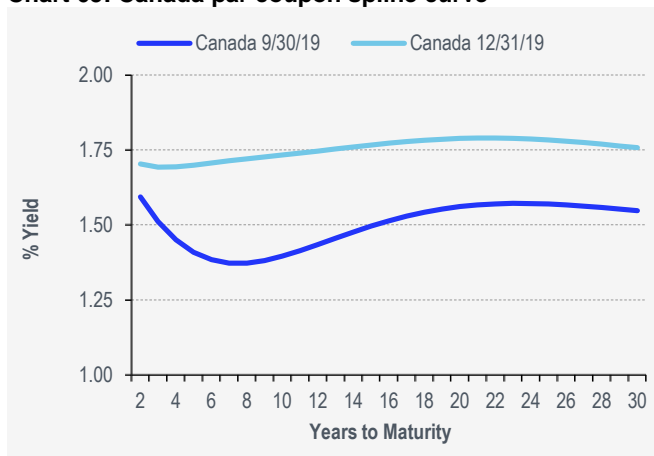
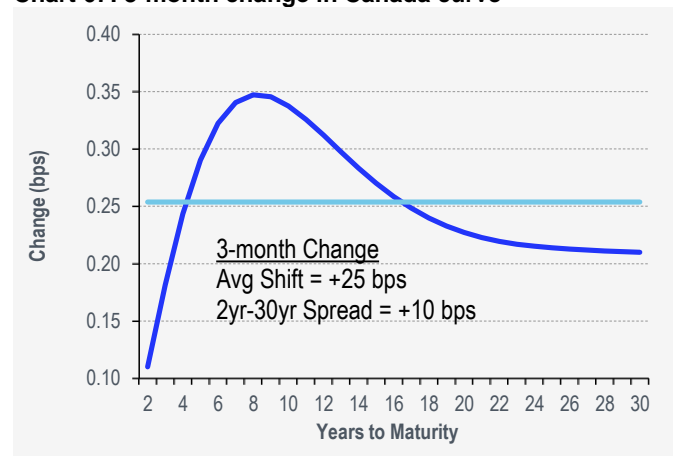


Chart 67: 3-month change in Canada curve



Correlation

Table 30: 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	0.92	0.76	0.06	0.50	0.40
Global govt	W0G1		1.00	0.96	0.86	0.76	0.90	0.90	0.83	0.63	-0.09	0.39	0.27
Quasi-govt	G0BQ			1.00	0.89	0.84	0.92	0.94	0.90	0.73	0.06	0.46	0.38
Securitized/Collat	G0BL				1.00	0.79	0.87	0.88	0.84	0.68	0.04	0.49	0.40
Corporate	G0BC					1.00	0.90	0.95	0.99	0.98	0.47	0.71	0.68
AAA Corp	GBC1						1.00	0.96	0.95	0.80	0.10	0.51	0.40
AA Corp	GBC2							1.00	0.99	0.87	0.22	0.57	0.50
A Corp	GBC3								1.00	0.93	0.33	0.64	0.58
BBB Corp	GBC4									1.00	0.62	0.77	0.78
High Yield	HW00										1.00	0.69	0.84
EXD EM sov	EMGB											1.00	0.88
EXD EM corp	EMCB												1.00

Table 31: 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	0.10	0.49	0.37
Global govt	W0G1		1.00	0.95	0.82	0.69	0.89	0.84	0.74	0.56	-0.10	0.34	0.18
Quasi-govt	G0BQ			1.00	0.88	0.82	0.91	0.91	0.85	0.71	0.09	0.49	0.37
Securitized/Collat	G0BL				1.00	0.78	0.83	0.84	0.80	0.70	0.15	0.52	0.44
Corporate	G0BC					1.00	0.81	0.95	0.99	0.98	0.55	0.71	0.71
AAA Corp	GBC1						1.00	0.90	0.84	0.70	0.07	0.44	0.32
AA Corp	GBC2							1.00	0.97	0.87	0.33	0.58	0.54
A Corp	GBC3								1.00	0.95	0.48	0.66	0.65
BBB Corp	GBC4									1.00	0.69	0.77	0.81
High Yield	HW00										1.00	0.69	0.86
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
Coupon	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).
MBS Principal Paydown³	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.
Amortization/Roll	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 ¹ (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.)
Curve Shift	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 ² .	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.)
Curve Reshape	The impact on a bond's price resulting from changes in the shape of the yield curve ² .	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.)
Volatility Change	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.)
Spread Change	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.
Total Return	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.

¹ 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.

² 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.

³ MBS Principal Paydown applies only to U.S. Mortgage Backed Securities.

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