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Research

Interest Rate Volatility: Identifying optimal swaption structures

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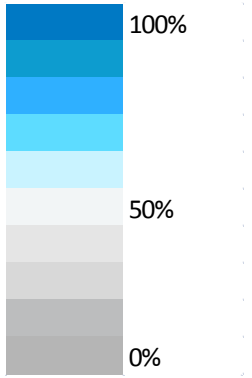
Vol & skew overview

Restricted - External

USD vol surface: Long expiry vols remain low

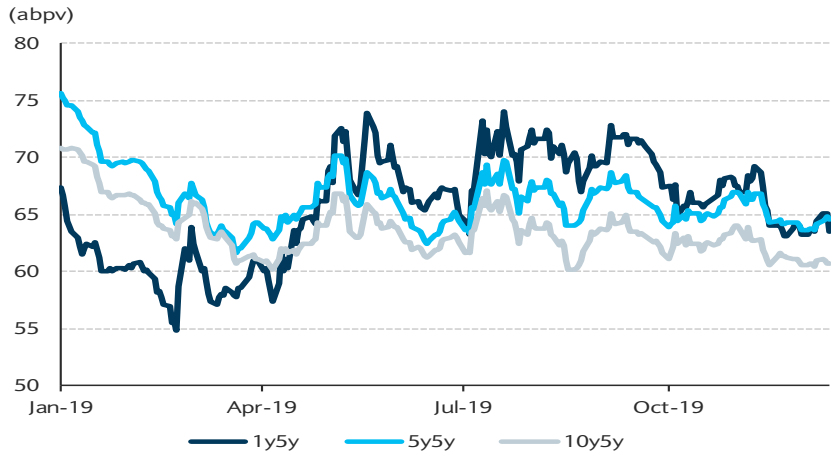
USD vol surface

(abpv)	1y	2y	5y	7y	10y	15y	20y	30y
3m	36.7	50.1	61.9	62.9	64.4	63.2	62.5	61.7
1y	53.0	58.4	63.5	64.0	64.7	63.3	62.2	61.1
3y	65.1	65.5	65.3	64.9	64.2	61.6	59.7	58.5
5y	65.6	65.1	64.6	64.0	63.1	59.9	57.7	56.3
7y	64.4	63.9	63.2	62.5	61.5	58.0	55.8	54.6
10y	62.4	61.6	60.7	60.0	59.0	55.1	53.2	52.1
15y	58.5	58.0	57.1	56.5	55.5	52.6	51.2	50.2

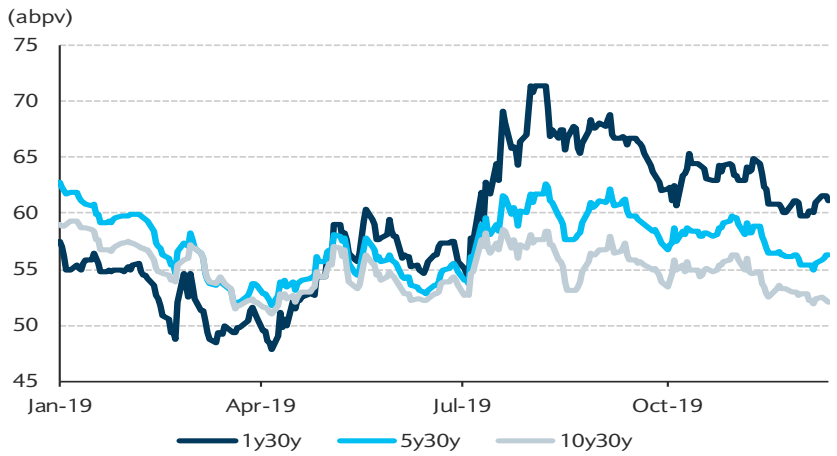


Note: Richness/Cheapness is determined using the expression (current value – 1y min.) / (1y max – 1y min)

Both USD 1y*5y and …



…USD 1y*30y vols have come off from the highs of 2019

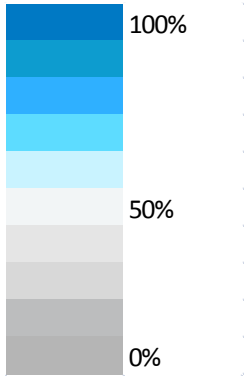


Note: As of 10 January 2020. Source for table and charts: Barclays Research

USD vol skew: Top-left skews have richened

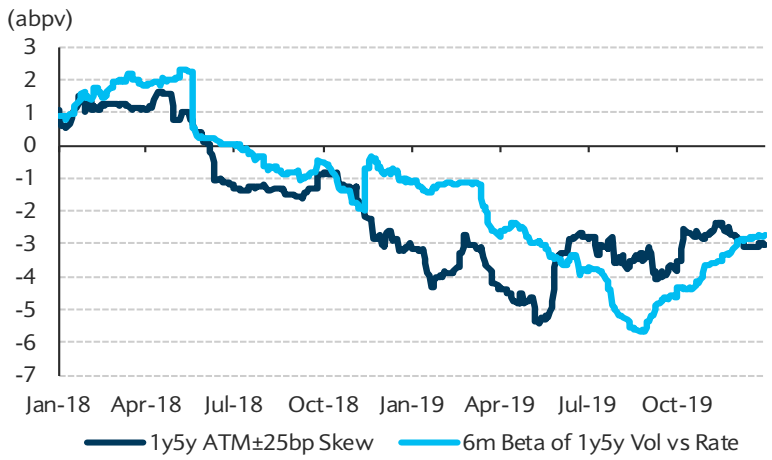
USD ATM+50 vs. ATM-50 USD skew

(abpv)	1y	2y	5y	7y	10y	15y	20y	30y
3m	-23.4	-23.9	-12.0	-9.9	-6.6	-6.7	-6.7	-6.7
1y	-11.7	-9.4	-5.6	-5.2	-4.4	-4.8	-5.1	-5.3
3y	-2.2	-1.8	-1.8	-2.0	-2.2	-2.3	-2.3	-2.3
5y	-0.8	-0.9	-1.1	-1.2	-1.3	-1.4	-1.5	-1.5
7y	-0.2	-0.3	-0.7	-0.8	-1.0	-1.1	-1.2	-1.2
10y	-0.2	-0.4	-0.8	-0.9	-1.0	-1.2	-1.2	-1.2
15y	-0.3	-0.5	-0.6	-0.7	-0.8	-0.9	-1.0	-0.9

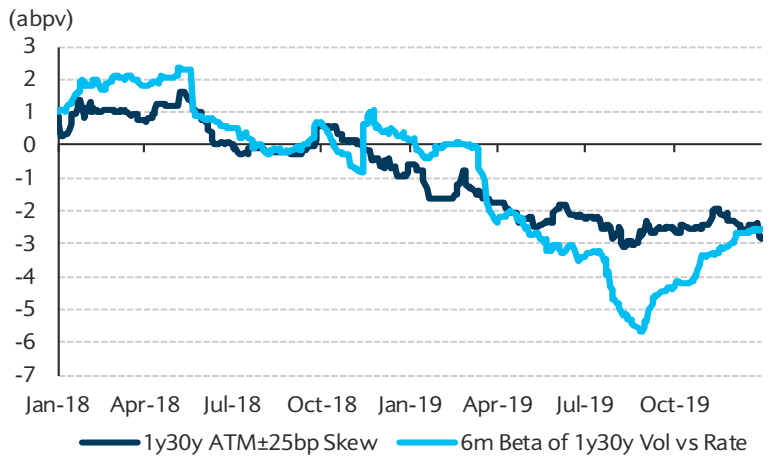


Note: Richness/Cheapness is determined using the expression (current value – 1y min.) / (1y max – 1y min)

USD 1y*5y skews and…



…1y*30y skews look reasonably priced compared with realised rate vol relationship



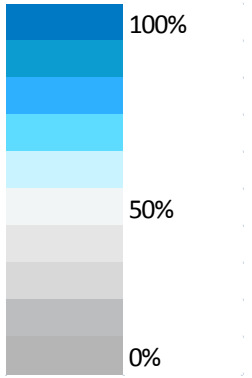
Note: As of 10 January 2020. Source for table and charts: Barclays Research

Restricted - External

EUR vol surface: Vols on long tenors are still high

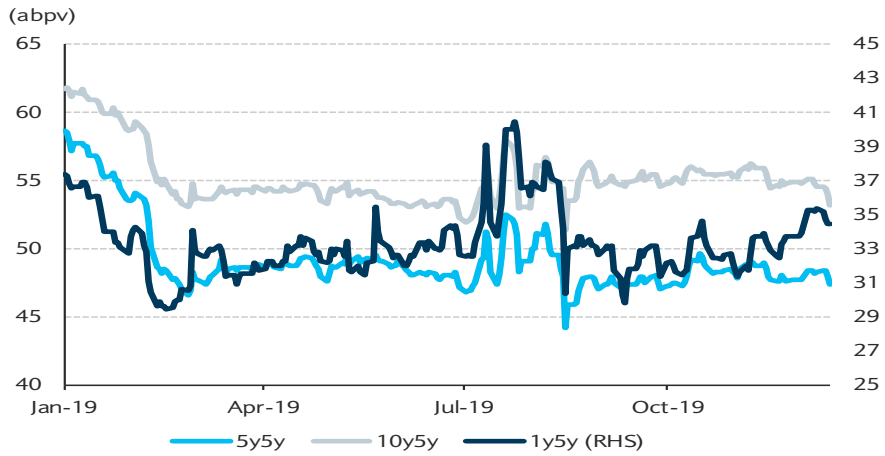
EUR vol surface

(abpv)	1y	2y	5y	7y	10y	15y	20y	30y
3m	11.2	14.2	31.3	36.5	42.4	46.4	48.3	48.7
1y	16.2	20.9	34.4	39.1	44.4	47.7	49.6	50.3
3y	32.8	35.6	42.2	45.1	48.0	49.2	50.5	50.5
5y	43.1	43.8	47.4	48.7	50.6	50.5	50.5	49.7
7y	48.7	48.4	50.6	51.4	52.5	51.5	50.9	49.2
10y	52.7	52.4	53.2	53.3	53.9	52.2	51.3	48.9
15y	52.7	52.4	52.4	52.4	52.8	50.8	49.5	46.7

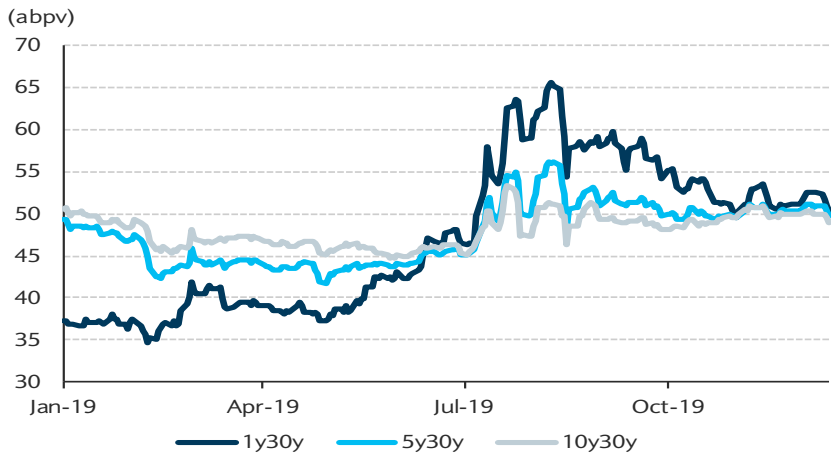


Note: Richness/Cheapness is determined using the expression (current value – 1y min.) / (1y max – 1y min)

EUR 1y*5y vols have inched higher recently



EUR 1y*30y vols, however, have remained largely unchanged

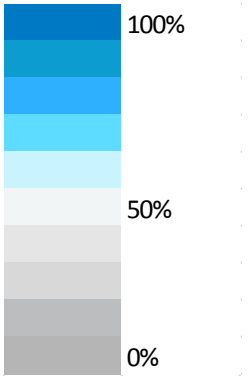


Note: As of 10 January 2020. Source for table and charts: Barclays Research

EUR vol skew: Mid- to long- expiry skews are low

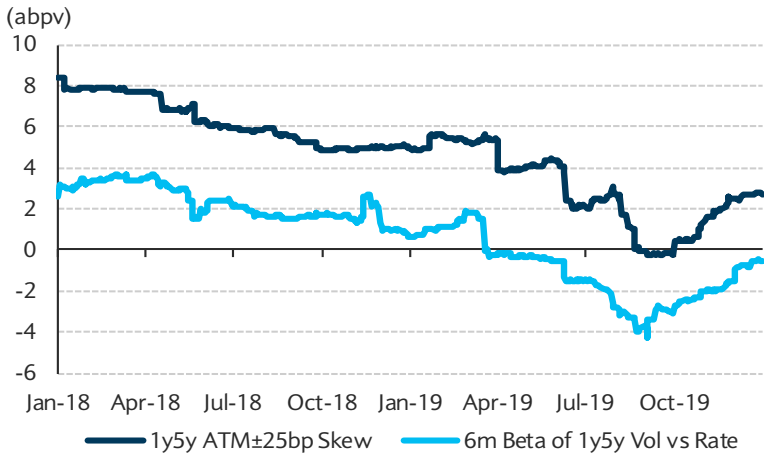
ATM+50 vs. ATM-50 EUR skew

(abpv)	1y	2y	5y	7y	10y	15y	20y	30y
3m	5.4	5.5	7.4	7.1	5.9	0.6	-5.2	-7.3
1y	4.7	5.0	4.7	3.9	2.2	-0.6	-3.4	-4.6
3y	5.5	4.7	3.8	2.7	1.2	-0.1	-1.3	-1.5
5y	5.0	4.2	3.2	2.4	1.1	0.4	-0.1	-0.4
7y	4.0	3.5	2.7	2.1	1.2	0.8	0.5	0.4
10y	3.1	2.9	2.0	1.8	1.4	1.2	1.1	1.0
15y	2.5	2.2	1.7	1.5	1.4	1.4	1.5	1.7

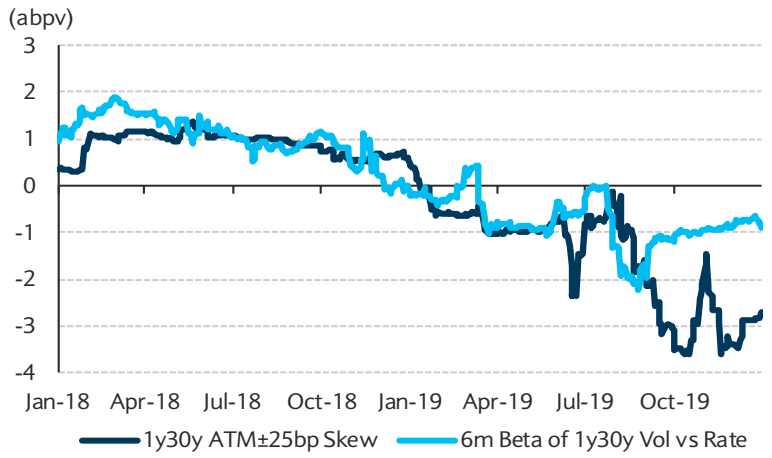


Note: Richness/Cheapness is determined using the expression (current value – 1y min.) / (1y max – 1y min)

Payer versus receiver skew in EUR 1y*5y remains fairly rich



While EUR 1y*30y skew looks cheap compared with the realised rate-vol relationship

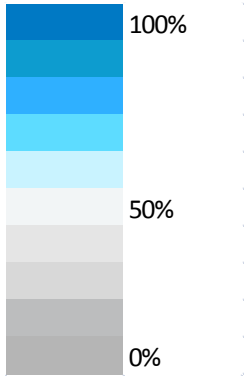


Note: As of 10 January 2020. Source for table and charts: Barclays Research

GBP vol surface: Vols on short tenors are low

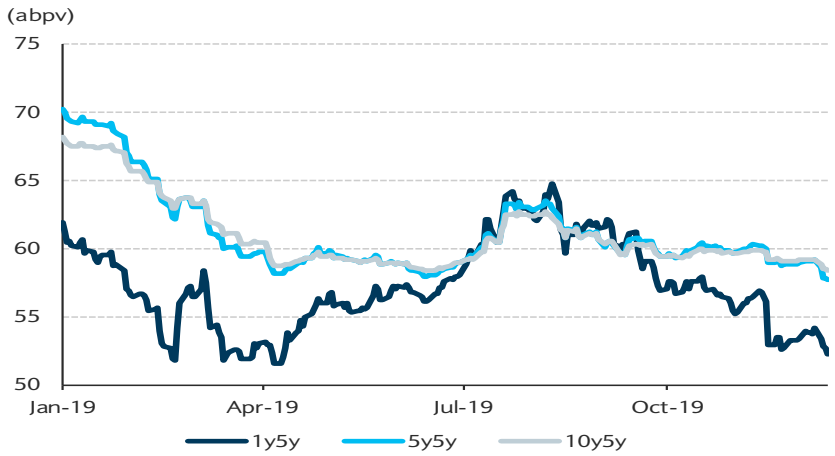
GBP vol surface

(abpv)	1y	2y	5y	7y	10y	15y	20y	30y
3m	30.2	37.9	48.8	52.8	56.7	57.7	58.2	59.1
1y	38.0	43.4	51.9	54.3	56.9	57.7	58.0	58.7
3y	49.9	51.4	55.8	56.9	57.3	57.0	56.5	55.9
5y	55.0	55.0	57.5	57.7	57.3	56.6	55.8	54.7
7y	57.5	56.7	58.0	57.9	57.1	56.0	55.1	53.6
10y	59.1	58.0	58.3	57.9	57.0	55.4	54.1	52.0
15y	59.4	57.6	57.3	57.0	56.2	54.5	53.1	50.5

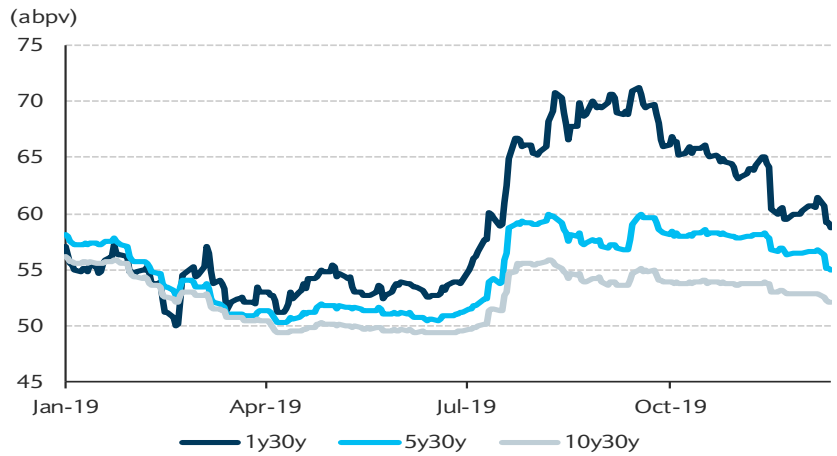


Note: Richness/Cheapness is determined using the expression (current value – 1y min.) / (1y max – 1y min)

GBP 1y*5y vols and...



...GBP 1y*30y vols have cheapened sizeably

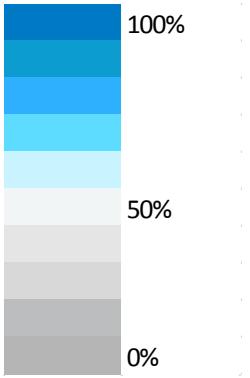


Note: As of 10 January 2020. Source for table and charts: Barclays Research

GBP vol skew: Skews across most of the surface are low

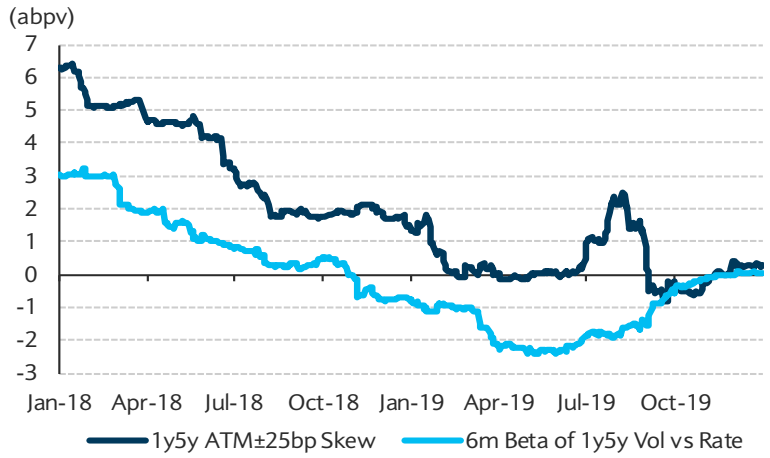
ATM+50 vs. ATM-50 GBP skew

(abpv)	1y	2y	5y	7y	10y	15y	20y	30y
3m	-5.7	-5.0	-1.9	-1.5	-0.9	-0.3	0.3	0.4
1y	1.8	2.1	0.7	0.9	1.2	1.3	1.4	1.5
3y	4.0	3.3	1.9	1.7	1.3	1.2	1.2	1.5
5y	3.1	2.9	2.2	1.9	1.5	1.4	1.4	1.6
7y	2.7	2.4	2.3	2.1	1.8	1.8	1.9	2.0
10y	2.3	2.1	2.3	2.1	1.9	2.1	2.3	2.4
15y	2.5	2.1	2.4	2.4	2.2	2.4	2.5	2.5

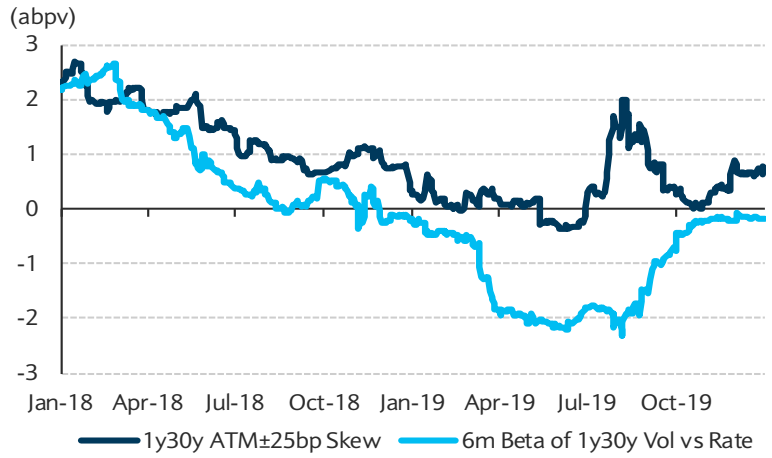


Note: Richness/Cheapness is determined using the expression (current value – 1y min.) / (1y max – 1y min)

While skew in GBP 1y*5y appears to be reasonably priced…



…GBP 1y*30y appears slightly rich compared with realised rate-vol relationship



Note: As of 10 January 2020. Source for table and charts: Barclays Research

Restricted - External

Opportunities in forward vol space

Restricted - External

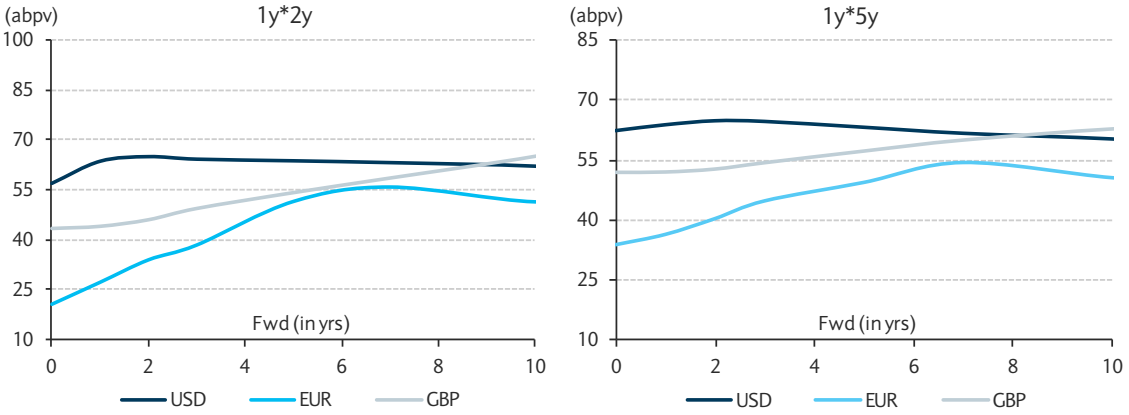
Forward vol calculations and comparison

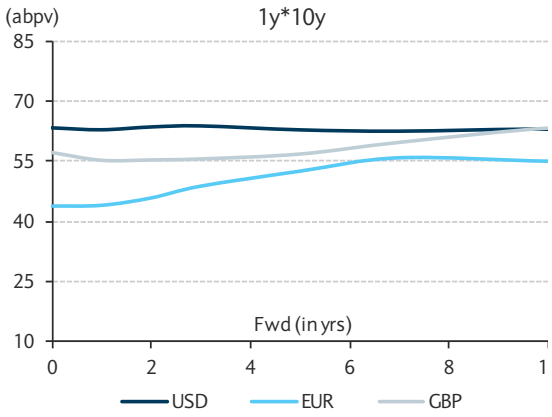
- Forward vols, ie, implied vols starting at future dates, offer a way to analyse how the market expects the implied vol surface to evolve.
- **Calculation:** Forward vols are usually not quoted in the market, but can be calculated by the option triangulation method using mid-curve vols.[1]
- **Comparison:** We plot the forward vols for short (1y) and long (5y) expiry options on various tenors, across USD, EUR and GBP. Opportunities are identified by looking at the slope of the forward vol curves.
  - **Steep upward slope:** Implies that vols are richer in the forward space. If the vol surface remains unchanged, then forward vols are likely to roll down to lower spot vol levels. Selling forward vols is, therefore, more attractive.
  - **Inverted slope:** Implies that vols are cheaper in the forward space. If the vol surface remains unchanged, then forward vols are likely to roll up to higher spot vol levels. Buying forward vols is, therefore, more attractive.
- Dislocations or views in forward vols are typically traded using calendar spreads and option triangles, although pure forward vol options are also occasionally traded.

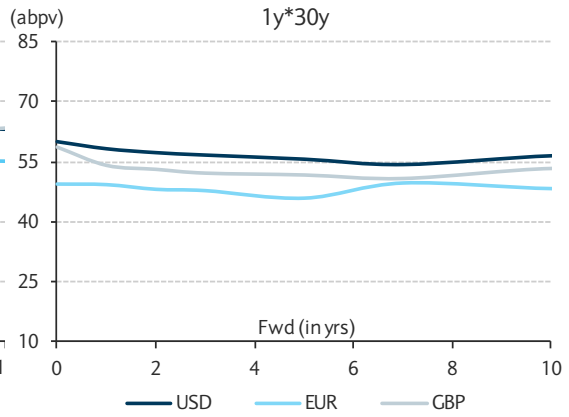
Note: [1]As an example, 5yf 5y*10y forward vol can be approximated by subtracting the time-weighted variance of 5y*(5yf 10y) mid-curve options from the variance of 10y*10y options. 5y*(5yf 10y) mid-curve vol, in turn, can be calculated using its two constituent vanilla implied vols, 5y*5y and 5y*15y. An implied correlation between 5yf 5y and 5yf 15y rates is required for the mid-curve vol calculation, which we have assumed to be 100%. Note that this assumption can lead to an underestimation of the mid-curve vol, and, hence, an overestimation of the forward vol.

Forward vol surface analysis offers RV opportunities

Forward vol curves for 1y expiry options



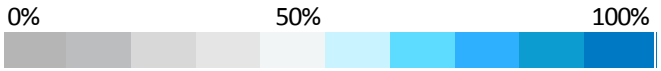




USD	2y	5y	10y	30y
1y	60	65	66	62
1yf 1y	65	65	64	59
2yf 1y	65	64	64	57
3yf 1y	65	65	64	56
4yf 1y	65	64	64	55

EUR	2y	5y	10y	30y
1y	21	34	45	51
1yf 1y	26	36	44	50
2yf 1y	36	40	46	49
3yf 1y	38	44	49	49
4yf 1y	44	47	52	49

GBP	2y	5y	10y	30y
1y	44	53	57	59
1yf 1y	45	52	55	55
2yf 1y	46	53	55	54
3yf 1y	49	54	56	53
4yf 1y	50	56	56	54



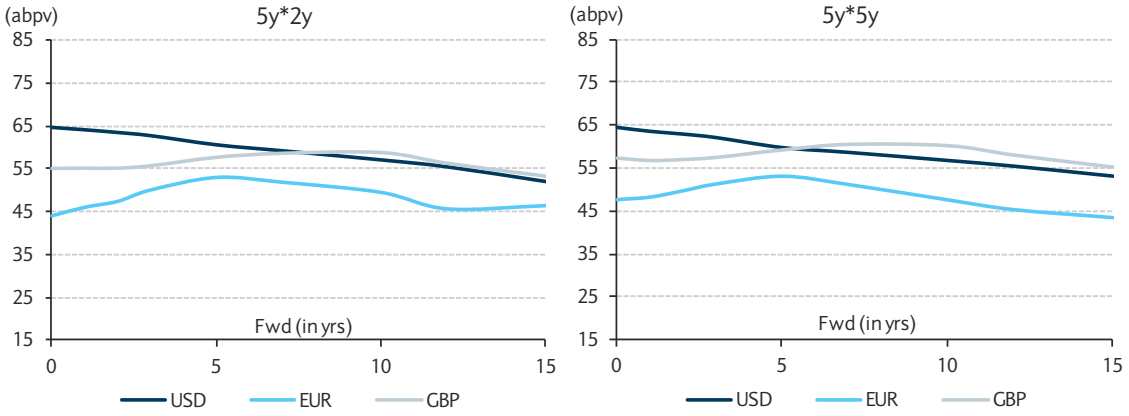
(Richness/Cheapness as been determined by as (current value – 1ymin) / (1y max – 1y min))

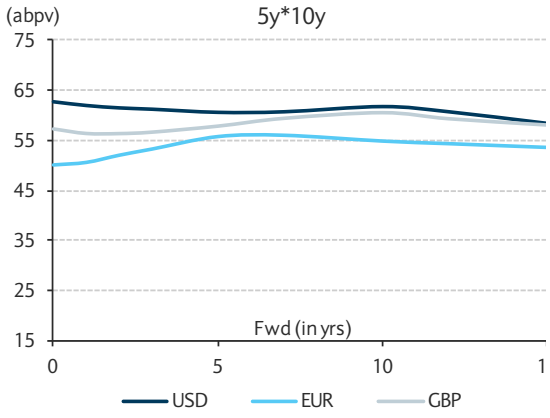
- 1y*2y forward vol remains highly upward sloping in EUR

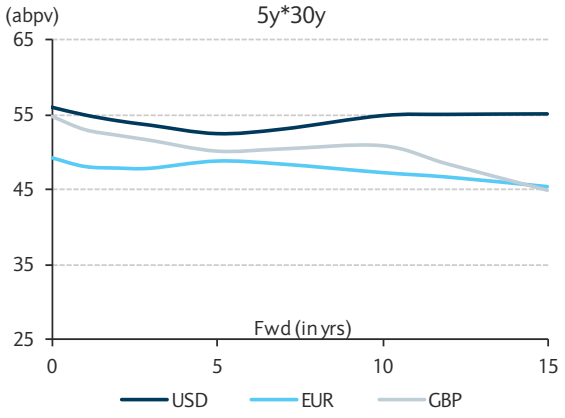
Note: As of 10 January 2020. Source for tables and charts: Barclays Research

Forward vol surface analysis offers RV opportunities

Forward vol curves for 5y expiry options



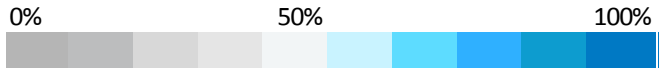




USD	2y	5y	10y	30y
5y	65	65	63	56
5yf 5y	61	60	61	53
10yf 5y	58	57	62	55
15yf 5y	53	54	59	56

EUR	2y	5y	10y	30y
5y	44	48	51	50
5yf 5y	53	53	56	51
10yf 5y	50	48	56	49
15yf 5y	47	43	54	46

GBP	2y	5y	10y	30y
5y	55	58	58	55
5yf 5y	58	59	58	51
10yf 5y	58	60	60	52
15yf 5y	52	54	57	45



(Richness/Cheapness as been determined by as (current value – 1ymin) / (1y max – 1y min))

Note: As of 10 January 2020. Source for tables and charts: Barclays Research

Identification of optimal option triangle structures

Methodology

- We analyse option triangle structures in USD, EUR and GBP on the following metrics:
  - **Forward vol level (in abpv):** The level is calculated using the spot implied vol surface for the respective currency. We format the forward vols based on how rich (in **blue**) or cheap (in **grey**) they are compared with their respective two-year histories.
  - **Price of the option triangle (cents):** When buying an option triangle, a low initial premium outlay (in **grey**), compared with its own two-year history, is preferred. Conversely, when selling an option triangle, a higher premium intake (in **blue**) is desirable.
  - **1y carry (cents):** Carry is calculated under a scenario in which the rates curve and vol surface remain unchanged over time, and forward rates and vols roll to spot. We format the carry based on how high or low it is compared with its own two-year history. A higher carry (in **blue**), from a historical context, is desirable when buying an option triangle.
  - **P&L in 1y, if underlying rates stay at their strikes (as % of initial premium):** An option triangle has a short gamma exposure. Therefore, barring any gains from a breakdown in correlation of underlying rates, an option triangle typically has its maximum P&L if the forward rates get realised, ie, underlying rates remain at their respective strikes.
  - **P&L in 1y, normalised for option expiries:** The above-mentioned P&L depends on the expiries of the different options in the triangle. Therefore, to make the P&L numbers comparable across various structures, we normalise them for the expiries of the options. The resulting normalised P&L is then largely a function of the roll-down in the vol surface. When buying an option triangle, a higher normalised P&L is desirable (in green).

- Based on these metrics, we identify wedges that are **cheap** on a relative value basis **(in blue)** and those that are **rich (in grey).**

Restricted - External

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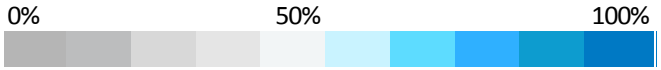
Option triangle structures in USD

USD Option Triangles								
Long Legs		Short Leg	fwd vol	Fwd vol level (abpv)	Price of option triangle (cts)	1y carry (cts)	1y P&L, if rates stay at their strikes (as % of initial cost)	1y P&L, normalised for expiries of options
1y1y	2y1y	1y2y	1yf 1y1y	60	18	26	1.27	0.90
2y1y	3y1y	2y2y	2yf 1y1y	62	14	4	0.27	0.88
1y2y	3y1y	1y3y	1yf 2y1y	66	37	35	0.80	0.86
2y2y	4y1y	2y3y	2yf 2y1y	65	29	8	0.30	1.20
1y3y	4y1y	1y4y	1yf 3y1y	65	47	45	0.80	1.09
2y3y	5y1y	2y4y	2yf 3y1y	65	39	8	0.22	1.00
1y1y	2y2y	1y3y	1yf 1y2y	64	41	58	1.20	0.85
2y1y	3y2y	2y3y	2yf 1y2y	65	31	10	0.33	1.10
1y2y	3y2y	1y4y	1yf 2y2y	66	72	79	0.91	0.97
2y2y	4y2y	2y4y	2yf 2y2y	65	56	16	0.29	1.18
1y3y	4y2y	1y5y	1yf 3y2y	64	92	82	0.86	1.17
2y3y	5y2y	2y5y	2yf 3y2y	64	75	16	0.21	0.99
1y2y	3y5y	1y7y	1yf 2y5y	65	171	168	0.99	1.07
3y2y	5y5y	3y7y	3yf 2y5y	64	115	20	0.18	1.11
1y5y	6y5y	1y10y	1yf 5y5y	63	315	169	0.62	1.14
5y5y	10y5y	5y10y	5yf 5y5y	60	175	23	0.13	1.58
1y10y	11y5y	1y15y	1yf 10y5y	60	439	175	0.40	1.10
5y10y	15y5y	5y15y	5yf 10y5y	59	304	19	0.06	0.90

USD Option Triangles								
Long Legs		Short Leg	fwd vol	Fwd vol level (abpv)	Price of option triangle (cts)	1y carry (cts)	1y P&L, if rates stay at their strikes (as % of initial cost)	1y P&L, normalised for expiries of options
1y5y	6y10y	1y15y	1yf 5y10y	62	595	328	0.60	1.10
5y5y	10y10y	5y15y	5yf 5y10y	61	361	34	0.09	1.09
10y5y	15y10y	10y15y	10yf 5y10y	62	284	9	0.03	0.62
1y10y	11y10y	1y20y	1yf 10y10y	58	810	338	0.41	1.13
5y10y	15y10y	5y20y	5yf 10y10y	57	561	37	0.06	0.94
10y10y	20y10y	10y20y	10yf 10y10y	58	445	18	0.04	0.96
1y5y	6y20y	1y25y	1yf 5y20y	56	945	628	0.68	1.25
5y5y	10y20y	5y25y	5yf 5y20y	52	518	61	0.11	1.40
10y5y	15y20y	10y25y	10yf 5y20y	53	403	12	0.03	0.63
1y10y	11y20y	1y30y	1yf 10y20y	52	1285	620	0.47	1.28
5y10y	15y20y	5y30y	5yf 10y20y	51	842	61	0.07	1.06
10y10y	20y20y	10y30y	10yf 10y20y	51	661	23	0.03	0.85



(Note: Richness/Cheapness as been determined by as (current value – 2ymin) / (2y max – 2y min))

Note: For 1y P&L, normalised for expiries: Consider an option triangle where the longer expiry is t_2 years and the shorter expiry is t_1 years. If the normal implied vol surface is flat across expiries and tenors, then the P&L of the trade in t_{carry} years (as a fraction of the initial cost), under the conditions of the forward rates getting realised, is approximately equal to $[\text{sqrt}(t_2 - t_{carry}) - \text{sqrt}(t_1 - t_{carry})] / [\text{sqrt}(t_2) - \text{sqrt}(t_1)] - 1$. We therefore divide the P&L by this factor to normalise them for expiries.

The forward vols have been calculated from the vanilla implied vol surfaces. 1y P&L, if rates stay at their strikes, has been calculated assuming constant implied vols after roll-down. Normalised 1y P&L numbers have been formatted based on how rich/cheap they are compared with other points. As of 10 January 2020. Source: Barclays Research

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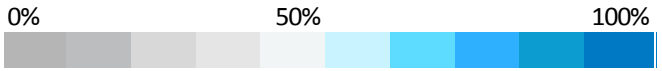
Option triangle structures in EUR

EUR Option Triangles								
Long Legs		Short Leg	fwd vol	Fwd vol level (abpv)	Price of option triangle (cts)	1y carry (cts)	1y P&L, if rates stay at their strikes (as % of initial cost)	1y P&L, normalised for expiries of options
1y1y	2y1y	1y2y	1yf 1y1y	24	8	-3	0.72	0.51
2y1y	**3y1y**	**2y2y**	**2yf 1y1y**	**34**	**9**	**-2**	**-0.10**	**-0.34**
1y2y	3y1y	1y3y	1yf 2y1y	32	18	0	0.64	0.68
2y2y	4y1y	2y3y	2yf 2y1y	39	18	-0	-0.05	-0.20
1y3y	4y1y	1y4y	1yf 3y1y	37	27	9	0.71	0.97
2y3y	5y1y	2y4y	2yf 3y1y	41	26	2	0.09	0.43
1y1y	2y2y	1y3y	1yf 1y2y	27	17	-1	1.07	0.76
2y1y	**3y2y**	**2y3y**	**2yf 1y2y**	**35**	**17**	**-1**	**-0.08**	**-0.26**
1y2y	3y2y	1y4y	1yf 2y2y	33	35	10	0.88	0.94
2y2y	4y2y	2y4y	2yf 2y2y	37	33	3	0.07	0.29
1y3y	**4y2y**	**1y5y**	**1yf 3y2y**	**38**	**55**	**24**	**0.84**	**1.15**
2y3y	5y2y	2y5y	2yf 3y2y	41	51	4	0.10	0.44
1y2y	**3y5y**	**1y7y**	**1yf 2y5y**	**40**	**108**	**57**	**1.03**	**1.10**
3y2y	5y5y	3y7y	3yf 2y5y	45	89	7	0.08	0.51
1y5y	**6y5y**	**1y10y**	**1yf 5y5y**	**48**	**267**	**105**	**0.59**	**1.08**
5y5y	10y5y	5y10y	5yf 5y5y	53	195	19	0.09	1.16
1y10y	11y5y	1y15y	1yf 10y5y	53	481	157	0.34	0.93
5y10y	15y5y	5y15y	5yf 10y5y	53	348	20	0.04	0.56

EUR Option Triangles								
Long Legs		Short Leg	fwd vol	Fwd vol level (abpv)	Price of option triangle (cts)	1y carry (cts)	1y P&L, if rates stay at their strikes (as % of initial cost)	1y P&L, normalised for expiries of options
1y5y	6y10y	1y15y	1yf 5y10y	51	570	241	0.52	0.96
5y5y	10y10y	5y15y	5yf 5y10y	56	427	21	0.03	0.35
10y5y	15y10y	10y15y	10yf 5y10y	55	305	34	0.09	1.95
1y10y	**11y10y**	**1y20y**	**1yf 10y10y**	**54**	**948**	**344**	**0.34**	**0.92**
5y10y	15y10y	5y20y	5yf 10y10y	54	689	41	0.03	0.45
10y10y	**20y10y**	**10y20y**	**10yf 10y10y**	**53**	**522**	**36**	**0.04**	**1.18**
1y5y	**6y20y**	**1y25y**	**1yf 5y20y**	**50**	**1060**	**590**	**0.57**	**1.04**
5y5y	10y20y	5y25y	5yf 5y20y	52	749	29	0.01	0.16
10y5y	15y20y	10y25y	10yf 5y20y	51	537	41	0.05	1.15
1y10y	**11y20y**	**1y30y**	**1yf 10y20y**	**51**	**1721**	**691**	**0.36**	**0.98**
5y10y	15y20y	5y30y	5yf 10y20y	50	1183	80	0.04	0.59
10y10y	20y20y	10y30y	10yf 10y20y	48	883	67	0.05	1.35



(Note: Richness/Cheapness as been determined by as (current value – 2ymin) / (2y max – 2y min))

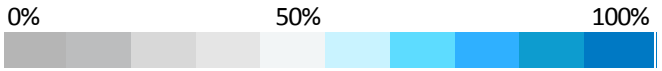
Note For 1y P&L, normalised for expiries: Consider an option triangle where the longer expiry is t_2 years and the shorter expiry is t_1 years. If the normal implied vol surface is flat across expiries and tenors, then the P&L of the trade in t_{carry} years (as a fraction of the initial cost), under the conditions of the forward rates getting realised, is approximately equal to $[\text{sqrt}(t_2 - t_{carry}) - \text{sqrt}(t_1 - t_{carry})] / [\text{sqrt}(t_2) - \text{sqrt}(t_1)] - 1$. We therefore divide the P&L by this factor to normalise them for expiries.

The forward vols have been calculated from the vanilla implied vol surfaces. 1y P&L, if rates stay at their strikes, has been calculated assuming constant implied vols after roll-down. Normalised 1y P&L numbers have been formatted based on how rich/cheap they are compared with other points. As of 10 January 2020. Source: Barclays Research

Option triangle structures in GBP

GBP Option Triangles								
Long Legs		Short Leg	fwd vol	Fwd vol level (abpv)	Price of option triangle (cts)	1y carry (cts)	1y P&L, if rates stay at their strikes (as % of initial cost)	1y P&L, normalised for expiries of options
1y1y	2y1y	1y2y	1yf 1y1y	40	11	14	1.74	1.23
2y1y	3y1y	2y2y	2yf 1y1y	46	10	0	0.10	0.34
1y2y	3y1y	1y3y	1yf 2y1y	48	25	19	1.00	1.07
2y2y	4y1y	2y3y	2yf 2y1y	50	20	5	0.23	0.92
1y3y	4y1y	1y4y	1yf 3y1y	52	38	25	0.77	1.05
2y3y	5y1y	2y4y	2yf 3y1y	53	32	6	0.20	0.94
1y1y	2y2y	1y3y	1yf 1y2y	44	25	33	1.69	1.19
2y1y	3y2y	2y3y	2yf 1y2y	46	20	6	0.30	1.00
1y2y	3y2y	1y4y	1yf 2y2y	49	52	45	1.05	1.12
2y2y	4y2y	2y4y	2yf 2y2y	50	41	11	0.28	1.14
1y3y	4y2y	1y5y	1yf 3y2y	52	75	56	0.85	1.17
2y3y	5y2y	2y5y	2yf 3y2y	52	61	15	0.24	1.10
1y2y	3y5y	1y7y	1yf 2y5y	55	146	127	1.01	1.09
3y2y	5y5y	3y7y	3yf 2y5y	55	100	16	0.15	0.93
1y5y	6y5y	1y10y	1yf 5y5y	57	302	163	0.60	1.11
5y5y	10y5y	5y10y	5yf 5y5y	59	209	11	0.05	0.64
1y10y	11y5y	1y15y	1yf 10y5y	58	482	180	0.37	1.01
5y10y	15y5y	5y15y	5yf 10y5y	58	348	22	0.06	0.99

GBP Option Triangles								
Long Legs		Short Leg	fwd vol	Fwd vol level (abpv)	Price of option triangle (cts)	1y carry (cts)	1y P&L, if rates stay at their strikes (as % of initial cost)	1y P&L, normalised for expiries of options
1y5y	6y10y	1y15y	1yf 5y10y	57	584	333	0.60	1.10
5y5y	10y10y	5y15y	5yf 5y10y	58	395	24	0.06	0.72
10y5y	15y10y	10y15y	10yf 5y10y	61	327	11	0.04	0.83
1y10y	11y10y	1y20y	1yf 10y10y	57	911	357	0.38	1.04
5y10y	15y10y	5y20y	5yf 10y10y	57	662	41	0.06	0.96
10y10y	20y10y	10y20y	10yf 10y10y	58	544	14	0.03	0.83
1y5y	6y20y	1y25y	1yf 5y20y	55	1054	667	0.63	1.17
5y5y	10y20y	5y25y	5yf 5y20y	54	669	59	0.09	1.07
10y5y	15y20y	10y25y	10yf 5y20y	56	560	13	0.03	0.61
1y10y	11y20y	1y30y	1yf 10y20y	54	1592	695	0.42	1.16
5y10y	15y20y	5y30y	5yf 10y20y	53	1131	77	0.07	1.09
10y10y	20y20y	10y30y	10yf 10y20y	53	917	25	0.03	0.90



(Note: Richness/Cheapness as been determined by as (current value – 2ymin) / (2y max – 2y min))

Note For 1y P&L, normalised for expiries: Consider an option triangle where the longer expiry is t_2 years and the shorter expiry is t_1 years. If the normal implied vol surface is flat across expiries and tenors, then the P&L of the trade in t_{carry} years (as a fraction of the initial cost), under the conditions of the forward rates getting realised, is approximately equal to $[\text{sqrt}(t_2 - t_{carry}) - \text{sqrt}(t_1 - t_{carry})] / [\text{sqrt}(t_2) - \text{sqrt}(t_1)] - 1$. We therefore divide the P&L by this factor to normalise them for expiries.

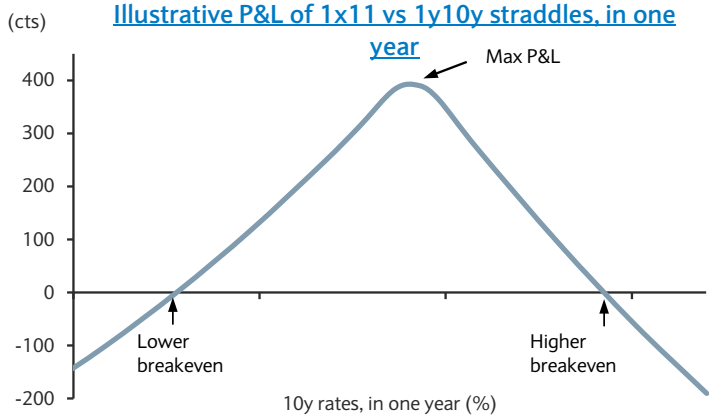
The forward vols have been calculated from the vanilla implied vol surfaces. 1y P&L, if rates stay at their strikes, has been calculated assuming constant implied vols after roll-down. Normalised 1y P&L numbers have been formatted based on how rich/cheap they are compared with other points. As of 10 January 2020. Source: Barclays Research

Selection of cap-floor versus swaption straddle wedges

Restricted - External

Methodology

- We analyse the attractiveness of cap-floor versus swaption ATM straddle wedges in USD, EUR and GBP on the following metrics:
  - **Cap-floor versus swaption vol difference:** When buying the wedge, a lower vol difference is desirable, as it implies a lower upfront cost. We compare the vol differences with respect to their own two-year history (**blue:** historically high, **grey:** historically low).
  - **Price of the wedge (in cts):** A cheaper wedge, from a historical perspective, is desirable when looking to buy cap-floor straddles. Conversely, an expensive structure implies that it may be more attractive to sell. We compare the prices with respect to their own two-year history (**blue:** historically rich, **grey:** cheap).
  - **1y carry (bp):** Calculated under a scenario in which the curve remains unchanged over time, forward rates and vols roll to spot. A higher carry is generally desirable when buying the wedge, as it implies a higher expected return under the unchanged curve scenario.
  - **Maximum P&L in 1y:** Since the trade has short gamma exposure, its max. P&L is if rates remain close to the strikes (see figure). A higher max. P&L, normalised by the initial premium, is generally desirable when buying a wedge. We calculate this max. P&L by parallel shifts in the rate curve, assuming vols (swaption & cap-floor) remain constant, after roll-down.
  - **Breakeven range in 1y:** A long wedge typically profits if rates remain within a range (see figure). Therefore, a wide range, compared with the history of the underlying rates, is generally desirable when buying the wedge. We show these ranges, calculated assuming constant vols after the roll-down, with the help of charts.



- Based on these metrics, we identify wedges that are **cheap** on a relative value basis **(in blue)** and those that are **rich (in grey).**

Restricted - External

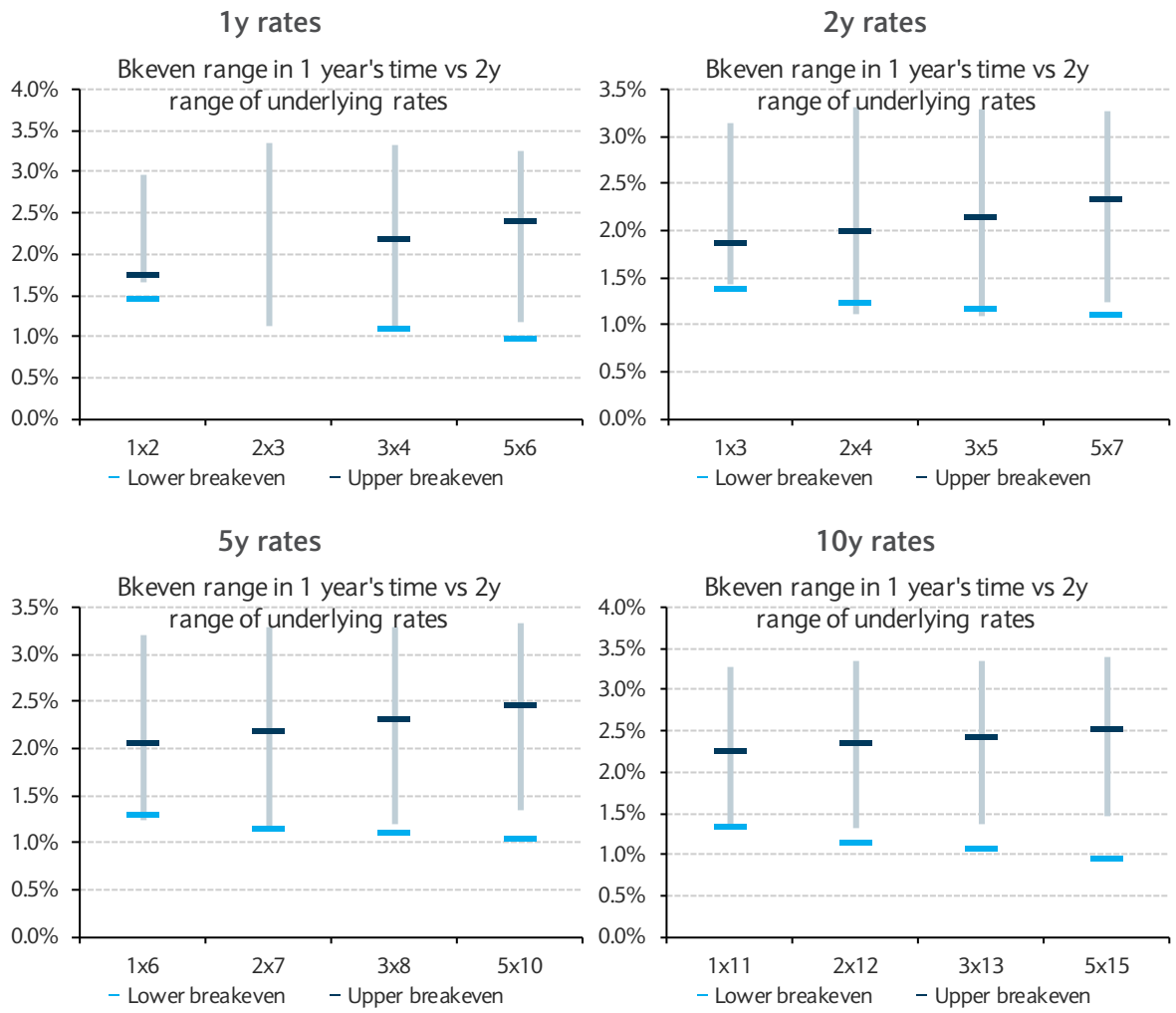
USD cap-floor versus swaption straddle wedges

USD Cap-Floor versus Swaption Straddle Wedge				
Wedge	Vol difference (abpv)	Price (cts)	1y carry in bps (of swap DV01)	Max P&L in 1y / Initial Prem **
1x2 vs 1y1y	0.2	8	1	1.21
1x3 vs 1y2y	0.3	34	14	0.96
1x6 vs 1y5y	**-0.1**	**195**	**28**	**0.68**
1x11 vs 1y10y	-1.0	624	34	0.51
2x3 vs 2y1y	**1.1**	**8**	**-0**	**-0.05**
2x4 vs 2y2y	0.2	30	2	0.15
2x7 vs 2y5y	-0.0	165	7	0.19
2x12 vs 2y10y	-0.6	532	11	0.17
3x4 vs 3y1y	0.4	7	1	0.19
3x5 vs 3y2y	0.2	27	2	0.12
3x8 vs 3y5y	0.0	144	5	0.14
3x13 vs 3y10y	-0.4	469	7	0.13
5x6 vs 5y1y	0.2	6	1	0.15
5x7 vs 5y2y	0.5	23	1	0.10
5x10 vs 5y5y	0.0	117	3	0.11
5x15 vs 5y10y	-0.4	379	5	0.10

(** Max P&L has been calculated using constant vols, after roll-down. To calculate this max P&L, we parallel bump the rates curve to bring the forward rate back to the strike rate.)

0% 50% 100%

(Note: Richness/Cheapness as been determined by as (current value – 2ymin) / (2y max – 2y min))



(Note: Breakeven range has been calculated assuming constant swaption and cap-floor vols and parallel rate shifts in the rate curve, after roll-down. Where breakeven ranges have not been shown, the structure does not have positive MTM for any levels of rates, assuming vol levels remain unchanged after roll-down.)

Note: All cap-floor straddles have been calculated vs 3m Libor. All swaption straddles have also been calculated vs 3m Libor. As of 10 January 2020. Source: Barclays Research

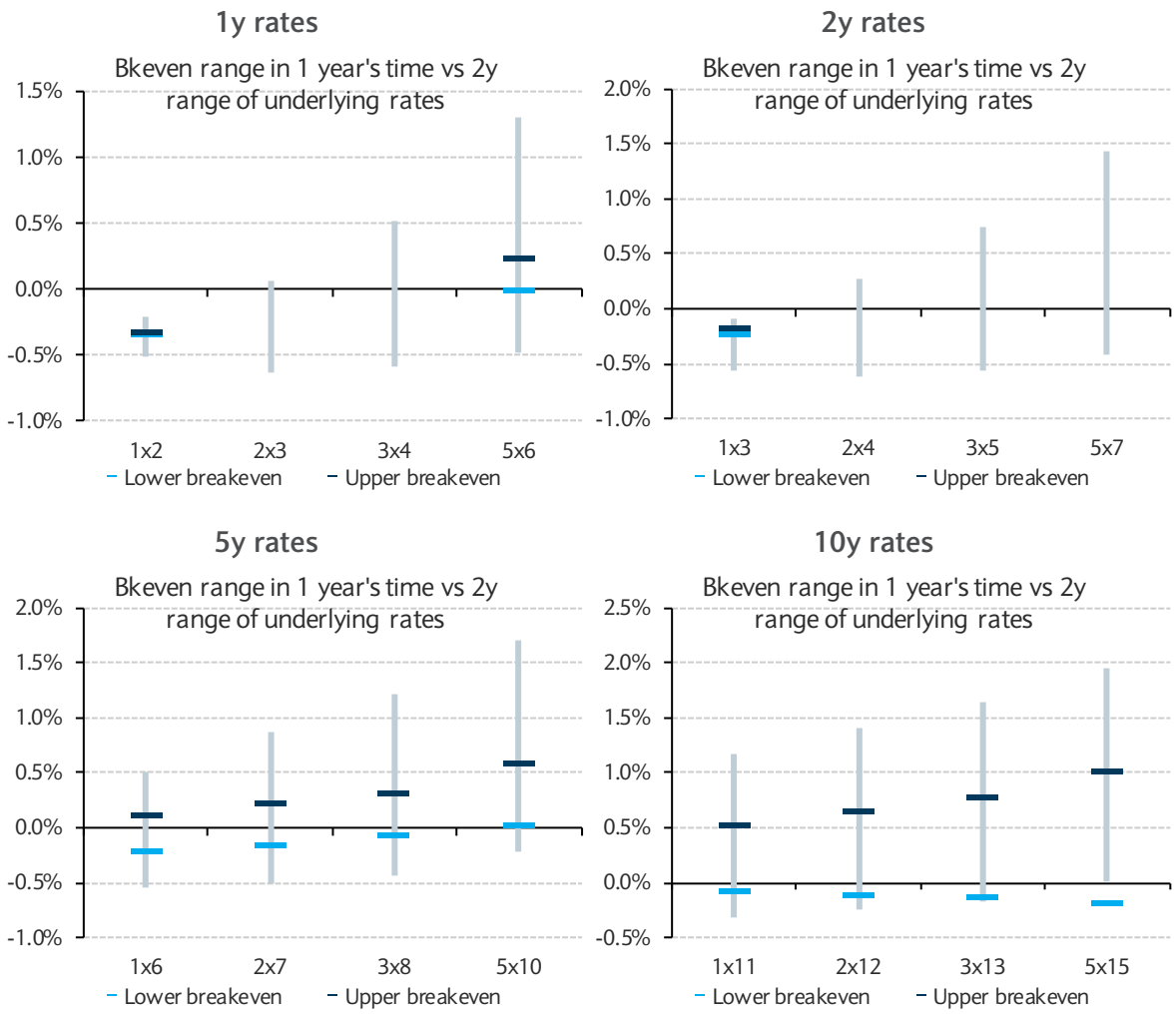
EUR cap-floor versus swaption straddle wedges

EUR Cap-Floor versus Swaption Straddle Wedge				
Wedge	Vol difference (abpv)	Price (cts)	1y carry in bp (of swap DV01)	Max P&L in 1y / Initial Prem **
1x2 vs 1y1y	2.1	5	-2	0.06
1x3 vs 1y2y	2.9	20	-3	0.18
1x6 vs 1y5y	2.1	140	5	0.41
1x11 vs 1y10y	2.6	606	15	0.36
2x3 vs 2y1y	**2.5**	**6**	**-2**	**-0.25**
2x4 vs 2y2y	**3.0**	**23**	**-2**	**-0.10**
2x7 vs 2y5y	2.4	137	2	0.06
2x12 vs 2y10y	2.7	553	7	0.11
3x4 vs 3y1y	**2.4**	**7**	**-1**	**-0.10**
3x5 vs 3y2y	**2.8**	**25**	**-1**	**-0.05**
3x8 vs 3y5y	2.7	138	1	0.03
3x13 vs 3y10y	2.5	516	5	0.09
5x6 vs 5y1y	2.0	8	0	0.01
5x7 vs 5y2y	2.7	27	-0	-0.01
5x10 vs 5y5y	2.8	137	1	0.02
5x15 vs 5y10y	2.0	455	4	0.07

(** Max P&L has been calculated using constant vols, after roll-down. To calculate this max P&L, we parallel bump the rates curve to bring the forward rate back to the strike rate.)

0% 50% 100%

(Note: Richness/Cheapness as been determined by as (current value – 2ymin) / (2y max – 2y min))



(Note: Breakeven range has been calculated assuming constant swaption and cap-floor vols and parallel rate shifts in the rate curve, after roll-down. Where breakeven ranges have not been shown, the structure does not have positive MTM for any levels of rates, assuming vol levels remain unchanged after roll-down.)

Note: All cap-floor straddles have been calculated vs 3m Euribor. For swaptions, 1y tenor options are vs 3m Euribor, while rest are vs 6m Euribor. As of 10 January 2020. Source: Barclays Research

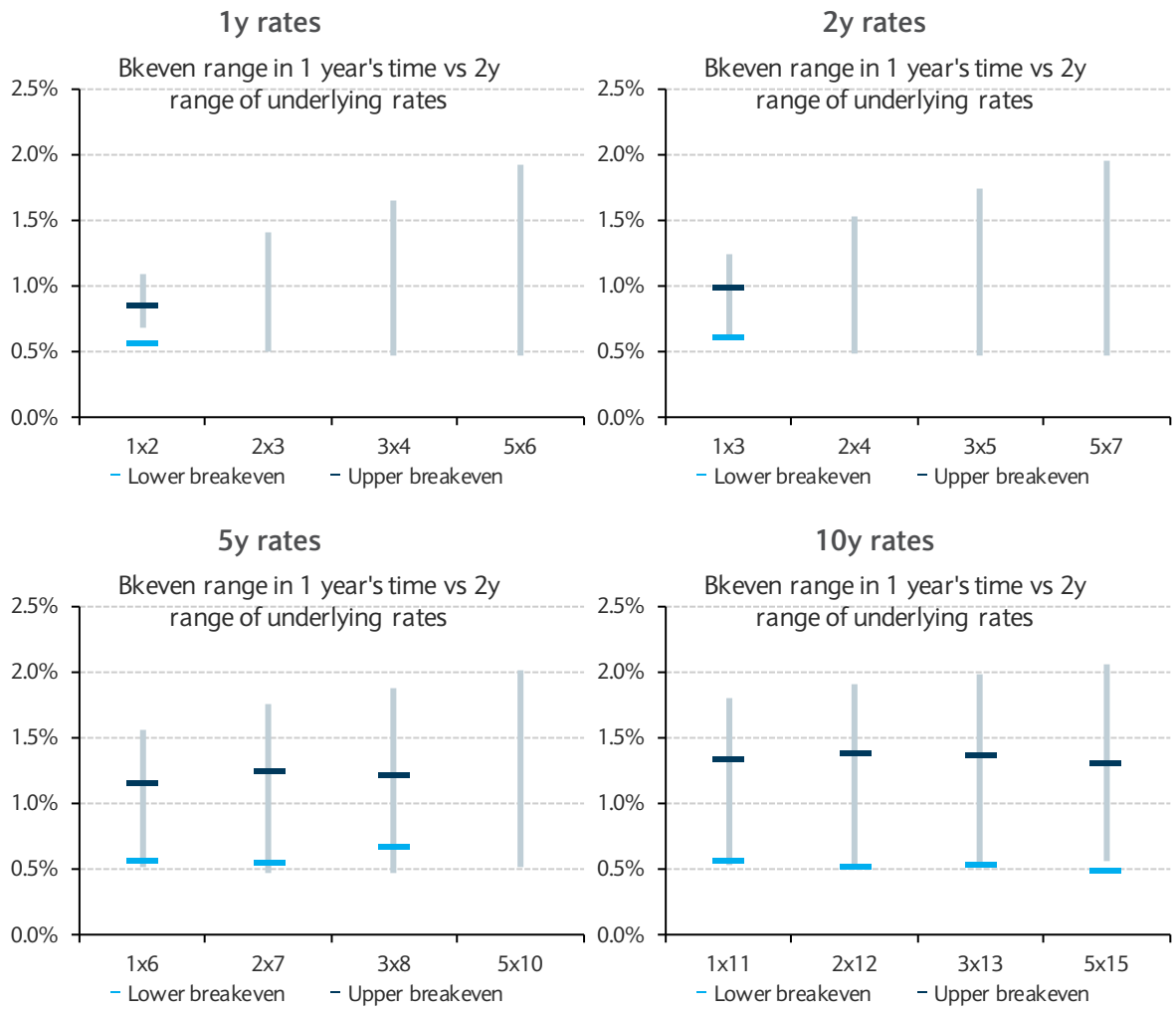
GBP cap-floor versus swaption straddle wedges

GBP Cap-Floor versus Swaption Straddle Wedge				
Wedge	Vol difference (abpv)	Price (cts)	1y carry in bp (of swap DV01)	Max P&L in 1y / Initial Prem**
1x2 vs 1y1y	-0.1	5	8	1.60
1x3 vs 1y2y	-1.1	22	11	1.10
1x6 vs 1y5y	-0.5	159	19	0.63
1x11 vs 1y10y	1.1	611	27	0.44
2x3 vs 2y1y	1.0	6	-1	-0.08
2x4 vs 2y2y	1.0	24	-0	-0.03
2x7 vs 2y5y	0.7	145	3	0.11
2x12 vs 2y10y	2.5	556	6	0.10
3x4 vs 3y1y	1.9	7	-1	-0.15
3x5 vs 3y2y	2.3	26	-1	-0.09
3x8 vs 3y5y	1.8	141	1	0.03
3x13 vs 3y10y	3.6	529	3	0.05
5x6 vs 5y1y	3.0	10	-2	-0.16
5x7 vs 5y2y	4.0	31	-1	-0.06
5x10 vs 5y5y	3.5	142	-0	-0.01
5x15 vs 5y10y	5.3	504	1	0.02

(** Max P&L has been calculated using constant vols, after roll-down. To calculate this max P&L, we parallel bump the rates curve to bring the forward rate back to the strike rate.)

0% 50% 100%

(Note: Richness/Cheapness as been determined by as (current value – 2ymin) / (2y max – 2y min))



(Note: Breakeven range has been calculated assuming constant swaption and cap-floor vols and parallel rate shifts in the rate curve, after roll-down. Where breakeven ranges have not been shown, the structure does not have positive MTM for any levels of rates, assuming vol levels remain unchanged after roll-down.)

Note: All cap-floor straddles have been calculated vs 3m Libor. For swaptions, 1y tenor options are vs 3m Libor, while rest are vs 6m Libor. As of 10 January 2020. Source: Barclays Research

Optimal expiry/tenor selection for zero-cost receiver spreads

Methodology

- We construct zero-cost 1x2 and 1x1.5 receiver spreads for up to 3y expiries along the USD, EUR and GBP surfaces.
  - For each spread, one leg is struck ATM
  - The lower strike is selected so that the trade is zero cost
- We use the following metrics to evaluate each structure. The metrics are shown in the tables that follow.
  - **3m/1y Carry:** Calculated under a scenario in which the curve remains unchanged over time, forward rates and vols roll to spot. A higher carry is desirable, as it implies a higher expected return under the unchanged curve scenario (in **blue**). We calculate 3m carry for options with less than 1y expiry and 1y carry for longer expiry options.
  - **Rate below which trade loses over a 3m/1y horizon:** Should be low compared with lowest levels for that particular rate over the past one/two years (in **blue**). This metric evaluates the trade on the basis of its historical downside.
  - **Breakeven rate on expiry:** Should be low compared with the current spot rate (in **grey**). This metric evaluates the trade, from a terminal perspective, on the basis of its downside relative to current levels.
- We highlight tenor/expiry combinations that do the best on all three metrics.

Restricted - External

USD zero-cost receiver spreads (short expiry)

USD 1x2 Receiver spreads

Option	Fwd rate	Moneyness of lower strike (ATM +)	Analysis on expiry		Analysis in three months		
			Breakeven rate on expiry	Spot Rate	3m carry (bp of underlying swap)	Rate Level at which trade loses in 3m	Lowest rate level in last 1yr
3m1y	1.66%	-11	1.44%	1.73%	0.0	1.44%	1.64%
3m2y	1.60%	-15	1.30%	1.64%	0.0	1.30%	1.43%
3m5y	1.64%	-17	1.30%	1.64%	0.0	1.30%	1.25%
3m10y	1.80%	-17	1.46%	1.79%	0.3	1.46%	1.34%
3m20y	1.96%	-17	1.62%	1.96%	-0.1	1.62%	1.49%
3m30y	1.98%	-16	1.66%	1.98%	0.1	1.66%	1.51%
6m1y	1.61%	-18	1.25%	1.73%	1.9	1.34%	1.43%
6m2y	**1.58%**	**-22**	**1.14%**	**1.64%**	**2.6**	**1.27%**	**1.29%**
6m5y	1.64%	-24	1.16%	1.64%	3.3	1.33%	1.20%
6m10y	1.81%	-24	1.33%	1.79%	3.5	1.50%	1.32%
6m20y	1.97%	-24	1.49%	1.96%	3.3	1.65%	1.48%
6m30y	1.99%	-24	1.51%	1.98%	3.2	1.67%	1.51%
9m1y	1.58%	-25	1.08%	1.73%	2.4	1.28%	1.30%
9m2y	1.57%	-29	0.99%	1.64%	2.4	1.27%	1.19%
9m5y	1.65%	-30	1.05%	1.64%	2.9	1.37%	1.17%
9m10y	1.82%	-30	1.22%	1.79%	3.0	1.54%	1.31%
9m20y	1.97%	-30	1.37%	1.96%	2.8	1.70%	1.47%
9m30y	1.99%	-29	1.41%	1.98%	2.8	1.73%	1.50%

USD 1x1.5 Receiver spreads

Option	Fwd rate	Moneyness of lower strike (ATM +)	Analysis on expiry		Analysis in three months		
			Breakeven rate on expiry	Spot Rate	3m carry (bp of underlying swap)	Rate Level at which trade loses in 3m	Lowest rate level in last 1yr
3m1y	1.66%	-7	1.45%	1.73%	0.0	1.45%	1.64%
3m2y	1.60%	-9	1.33%	1.64%	0.0	1.33%	1.43%
3m5y	1.64%	-10	1.34%	1.64%	0.0	1.34%	1.25%
3m10y	1.80%	-10	1.50%	1.79%	0.5	1.50%	1.34%
3m20y	1.96%	-10	1.66%	1.96%	0.2	1.66%	1.49%
3m30y	1.98%	-10	1.68%	1.98%	-0.1	1.68%	1.51%
6m1y	1.61%	-11	1.28%	1.73%	1.2	1.35%	1.43%
6m2y	**1.58%**	**-14**	**1.16%**	**1.64%**	**1.6**	**1.27%**	**1.29%**
6m5y	**1.64%**	**-15**	**1.19%**	**1.64%**	**2.0**	**1.34%**	**1.20%**
6m10y	1.81%	-15	1.36%	1.79%	2.1	1.50%	1.32%
6m20y	1.97%	-14	1.55%	1.96%	2.1	1.68%	1.48%
6m30y	1.98%	-14	1.56%	1.98%	2.1	1.70%	1.51%
9m1y	1.58%	-15	1.13%	1.73%	1.5	1.29%	1.30%
9m2y	1.57%	-17	1.06%	1.64%	1.5	1.29%	1.19%
9m5y	1.65%	-18	1.11%	1.64%	1.7	1.38%	1.17%
9m10y	1.82%	-18	1.28%	1.79%	1.8	1.56%	1.31%
9m20y	1.97%	-18	1.43%	1.96%	1.7	1.72%	1.47%
9m30y	1.99%	-18	1.45%	1.98%	1.6	1.72%	1.50%

Note: Rate level at which trade loses in 1y has been calculated under assumptions of constant vol. As of 13 January 2020. Source: Barclays Research

USD zero-cost receiver spreads (mid expiry)

USD 1x2 Receiver spreads

Option	Fwd rate	Moneyness of lower strike (ATM +)	Analysis on expiry		Analysis in one year		
			Breakeven rate on expiry	Spot Rate	1y carry (bp of underlying swap)	Rate Level at which trade loses in 1y	Lowest rate level in last 2 yrs
1y1y	1.55%	-32	0.91%	1.73%	0.0	0.91%	1.64%
1y2y	1.57%	-34	0.89%	1.64%	0.0	0.89%	1.43%
1y5y	1.66%	-35	0.96%	1.64%	1.2	0.96%	1.25%
1y10y	1.83%	-35	1.13%	1.79%	3.6	1.13%	1.34%
1y20y	1.98%	-34	1.30%	1.96%	1.8	1.30%	1.49%
1y30y	1.99%	-34	1.31%	1.98%	0.5	1.31%	1.51%
2y1y	**1.58%**	**-49**	**0.60%**	**1.73%**	**7.2**	**0.86%**	**1.12%**
2y2y	**1.61%**	**-50**	**0.61%**	**1.64%**	**7.3**	**0.92%**	**1.10%**
2y5y	1.72%	-49	0.74%	1.64%	7.1	1.10%	1.16%
2y10y	1.89%	-49	0.91%	1.79%	7.0	1.28%	1.32%
2y20y	2.01%	-46	1.09%	1.96%	6.1	1.47%	1.48%
2y30y	2.01%	-45	1.11%	1.98%	5.8	1.49%	1.51%
3y1y	1.64%	-60	0.44%	1.73%	5.5	1.10%	1.06%
3y2y	1.68%	-60	0.48%	1.64%	4.9	1.18%	1.10%
3y5y	1.80%	-59	0.62%	1.64%	5.2	1.30%	1.20%
3y10y	1.95%	-59	0.77%	1.79%	5.2	1.46%	1.37%
3y20y	2.04%	-55	0.94%	1.96%	4.6	1.61%	1.50%
3y30y	2.02%	-54	0.94%	1.98%	4.5	1.61%	1.52%

USD 1x1.5 Receiver spreads

Option	Fwd rate	Moneyness of lower strike (ATM +)	Analysis on expiry		Analysis in one year		
			Breakeven rate on expiry	Spot Rate	1y carry (bp of underlying swap)	Rate Level at which trade loses in 1y	Lowest rate level in last 2 yrs
1y1y	1.55%	-19	0.98%	1.73%	0.0	0.98%	1.64%
1y2y	1.57%	-20	0.97%	1.64%	0.0	0.97%	1.43%
1y5y	1.66%	-21	1.03%	1.64%	1.2	1.03%	1.25%
1y10y	**1.83%**	**-21**	**1.20%**	**1.79%**	**3.7**	**1.20%**	**1.34%**
1y20y	1.98%	-21	1.35%	1.96%	1.6	1.35%	1.49%
1y30y	1.99%	-20	1.39%	1.98%	0.9	1.39%	1.51%
2y1y	**1.58%**	**-29**	**0.71%**	**1.73%**	**4.6**	**0.91%**	**1.12%**
2y2y	**1.61%**	**-30**	**0.71%**	**1.64%**	**4.6**	**0.96%**	**1.10%**
2y5y	1.72%	-30	0.82%	1.64%	4.3	1.13%	1.16%
2y10y	1.89%	-30	0.99%	1.79%	4.3	1.30%	1.32%
2y20y	2.01%	-28	1.17%	1.96%	3.7	1.49%	1.48%
2y30y	2.00%	-27	1.19%	1.98%	3.5	1.52%	1.51%
3y1y	1.64%	-36	0.56%	1.73%	3.4	1.12%	1.06%
3y2y	1.68%	-36	0.60%	1.64%	3.0	1.21%	1.10%
3y5y	1.80%	-36	0.72%	1.64%	3.1	1.32%	1.20%
3y10y	1.94%	-36	0.86%	1.79%	3.1	1.48%	1.37%
3y20y	2.03%	-33	1.04%	1.96%	2.7	1.63%	1.50%
3y30y	2.02%	-33	1.03%	1.98%	2.7	1.61%	1.52%

Note: Rate level at which trade loses in 1y has been calculated under assumptions of constant vol. As of 13 January 2020. Source: Barclays Research

EUR zero-cost receiver spreads (short expiry)

EUR 1x2 Receiver spreads

Option	Fwd rate	Moneyness of lower strike (ATM +)	Analysis on expiry		Analysis in three months		
			Breakeven rate on expiry	Spot Rate	3m carry (bp of underlying swap)	Rate Level at which trade loses in 3m	Lowest rate level in last 1yr
3m1y	-0.39%	-3	-0.45%	-0.39%	0.6	-0.45%	-0.57%
3m2y	-0.28%	-4	-0.36%	-0.30%	1.3	-0.36%	-0.57%
3m5y	**-0.11%**	**-8**	**-0.27%**	**-0.14%**	**2.2**	**-0.27%**	**-0.55%**
3m10y	**0.20%**	**-11**	**-0.02%**	**0.18%**	**2.5**	**-0.02%**	**-0.32%**
3m20y	0.59%	-13	0.33%	0.57%	2.0	0.33%	-0.01%
3m30y	0.62%	-14	0.34%	0.61%	1.2	0.34%	0.03%
6m1y	-0.38%	-5	-0.48%	-0.39%	0.8	-0.46%	-0.64%
6m2y	-0.26%	-6	-0.38%	-0.30%	1.2	-0.36%	-0.60%
6m5y	-0.09%	-11	-0.31%	-0.14%	2.0	-0.23%	-0.55%
6m10y	0.23%	-15	-0.07%	0.18%	2.6	0.03%	-0.30%
6m20y	0.60%	-19	0.22%	0.57%	2.6	0.35%	0.00%
6m30y	0.63%	-20	0.23%	0.61%	2.5	0.36%	0.03%
9m1y	-0.36%	-6	-0.48%	-0.39%	1.0	-0.44%	-0.67%
9m2y	-0.24%	-8	-0.40%	-0.30%	1.2	-0.34%	-0.61%
9m5y	-0.06%	-14	-0.34%	-0.14%	1.7	-0.20%	-0.54%
9m10y	0.26%	-19	-0.12%	0.18%	2.0	0.08%	-0.29%
9m20y	0.62%	-24	0.14%	0.57%	2.1	0.38%	0.01%
9m30y	0.64%	-25	0.14%	0.61%	2.1	0.39%	0.04%

EUR 1x1.5 Receiver spreads

Option	Fwd rate	Moneyness of lower strike (ATM +)	Analysis on expiry		Analysis in three months		
			Breakeven rate on expiry	Spot Rate	3m carry (bp of underlying swap)	Rate Level at which trade loses in 3m	Lowest rate level in last 1yr
3m1y	-0.39%	-2	-0.45%	-0.39%	0.6	-0.45%	-0.57%
3m2y	-0.28%	-3	-0.37%	-0.30%	1.2	-0.37%	-0.57%
3m5y	**-0.11%**	**-5**	**-0.26%**	**-0.14%**	**2.2**	**-0.26%**	**-0.55%**
3m10y	**0.20%**	**-7**	**-0.01%**	**0.18%**	**2.4**	**-0.01%**	**-0.32%**
3m20y	0.59%	-8	0.35%	0.57%	1.9	0.35%	-0.01%
3m30y	0.62%	-8	0.38%	0.61%	1.5	0.38%	0.03%
6m1y	-0.38%	-3	-0.47%	-0.39%	0.5	-0.45%	-0.64%
6m2y	-0.26%	-4	-0.38%	-0.30%	0.8	-0.36%	-0.60%
6m5y	-0.09%	-7	-0.30%	-0.14%	1.2	-0.23%	-0.55%
6m10y	0.23%	-9	-0.04%	0.18%	1.5	0.04%	-0.30%
6m20y	0.60%	-12	0.24%	0.57%	1.6	0.35%	0.00%
6m30y	0.63%	-12	0.27%	0.61%	1.5	0.38%	0.03%
9m1y	-0.36%	-4	-0.48%	-0.39%	0.6	-0.45%	-0.67%
9m2y	-0.24%	-5	-0.39%	-0.30%	0.7	-0.33%	-0.61%
9m5y	-0.06%	-9	-0.33%	-0.14%	1.0	-0.20%	-0.54%
9m10y	0.26%	-12	-0.10%	0.18%	1.2	0.08%	-0.29%
9m20y	0.62%	-14	0.20%	0.57%	1.3	0.41%	0.01%
9m30y	0.64%	-15	0.19%	0.61%	1.3	0.41%	0.04%

Note: Rate level at which trade loses in 1y has been calculated under assumptions of constant vol. As of 13 January 2020. Source: Barclays Research

EUR zero-cost receiver spreads (mid expiry)

EUR 1x2 Receiver spreads

Option	Fwd rate	Moneyness of lower strike (ATM +)	Analysis on expiry		Analysis in one year		
			Breakeven rate on expiry	Spot Rate	1y carry (bp of underlying swap)	Rate Level at which trade loses in 1y	Lowest rate level in last 2 yrs
1y1y	-0.34%	-8	-0.50%	-0.39%	4.8	-0.50%	-0.57%
1y2y	**-0.22%**	**-10**	**-0.42%**	**-0.30%**	**8.1**	**-0.42%**	**-0.57%**
1y5y	-0.03%	-17	-0.37%	-0.14%	10.6	-0.37%	-0.55%
1y10y	**0.29%**	**-23**	**-0.17%**	**0.17%**	**10.8**	**-0.17%**	**-0.32%**
1y20y	**0.63%**	**-27**	**0.09%**	**0.57%**	**5.7**	**0.09%**	**-0.01%**
1y30y	0.64%	-28	0.08%	0.61%	2.7	0.08%	0.03%
2y1y	**-0.24%**	**-17**	**-0.58%**	**-0.39%**	**5.7**	**-0.55%**	**-0.69%**
2y2y	-0.10%	-19	-0.48%	-0.30%	5.9	-0.44%	-0.61%
2y5y	0.09%	-26	-0.43%	-0.14%	5.4	-0.29%	-0.51%
2y10y	0.41%	-33	-0.25%	0.17%	5.7	-0.04%	-0.25%
2y20y	0.69%	-37	-0.05%	0.57%	5.0	0.23%	0.02%
2y30y	0.67%	-38	-0.09%	0.61%	4.7	0.21%	0.04%
3y1y	**-0.12%**	**-26**	**-0.64%**	**-0.39%**	**5.7**	**-0.50%**	**-0.66%**
3y2y	0.02%	-29	-0.56%	-0.30%	5.5	-0.37%	-0.57%
3y5y	0.22%	-35	-0.48%	-0.14%	4.6	-0.17%	-0.43%
3y10y	0.52%	-41	-0.30%	0.17%	4.5	0.12%	-0.16%
3y20y	0.73%	-46	-0.19%	0.57%	4.2	0.32%	0.06%
3y30y	0.69%	-46	-0.23%	0.61%	3.9	0.32%	0.06%

EUR 1x1.5 Receiver spreads

Option	Fwd rate	Moneyness of lower strike (ATM +)	Analysis on expiry		Analysis in one year		
			Breakeven rate on expiry	Spot Rate	1y carry (bp of underlying swap)	Rate Level at which trade loses in 1y	Lowest rate level in last 2 yrs
1y1y	**-0.34%**	**-5**	**-0.49%**	**-0.39%**	**4.7**	**-0.49%**	**-0.57%**
1y2y	**-0.22%**	**-6**	**-0.40%**	**-0.30%**	**4.8**	**-0.40%**	**-0.57%**
1y5y	-0.03%	-10	-0.33%	-0.14%	9.4	-0.33%	-0.55%
1y10y	**0.29%**	**-14**	**-0.13%**	**0.17%**	**10.9**	**-0.13%**	**-0.32%**
1y20y	**0.63%**	**-16**	**0.15%**	**0.57%**	**5.8**	**0.15%**	**-0.01%**
1y30y	0.64%	-17	0.13%	0.61%	2.6	0.13%	0.03%
2y1y	**-0.24%**	**-10**	**-0.54%**	**-0.39%**	**3.3**	**-0.51%**	**-0.69%**
2y2y	-0.10%	-12	-0.46%	-0.30%	3.4	-0.42%	-0.61%
2y5y	0.09%	-16	-0.39%	-0.14%	3.2	-0.27%	-0.51%
2y10y	0.41%	-20	-0.19%	0.17%	3.4	-0.01%	-0.25%
2y20y	0.69%	-23	0.00%	0.57%	3.1	0.23%	0.02%
2y30y	0.67%	-23	-0.02%	0.61%	3.0	0.22%	0.04%
3y1y	**-0.12%**	**-16**	**-0.60%**	**-0.39%**	**3.3**	**-0.48%**	**-0.66%**
3y2y	0.02%	-18	-0.52%	-0.30%	3.2	-0.35%	-0.57%
3y5y	0.23%	-21	-0.40%	-0.14%	2.5	-0.14%	-0.43%
3y10y	0.52%	-25	-0.23%	0.17%	2.5	0.14%	-0.16%
3y20y	0.74%	-28	-0.10%	0.57%	2.5	0.34%	0.06%
3y30y	0.69%	-28	-0.15%	0.61%	2.3	0.33%	0.06%

Note: Rate level at which trade loses in 1y has been calculated under assumptions of constant vol. As of 13 January 2020. Source: Barclays Research

GBP zero-cost receiver spreads (short expiry)

GBP 1x2 Receiver spreads

Option	Fwd rate	Moneyness of lower strike (ATM +)	Analysis on expiry		Analysis in three months		
			Breakeven rate on expiry	Spot Rate	3m carry (bp of underlying swap)	Rate Level at which trade loses in 3m	Lowest rate level in last 1yr
3m1y	0.60%	-10	0.40%	0.63%	0.0	0.40%	0.61%
3m2y	0.69%	-11	0.47%	0.70%	0.0	0.47%	0.60%
3m5y	0.79%	-14	0.51%	0.79%	0.9	0.51%	0.52%
3m10y	0.94%	-15	0.64%	0.93%	1.6	0.64%	0.53%
3m20y	1.05%	-15	0.75%	1.05%	1.5	0.75%	0.56%
3m30y	1.05%	-16	0.73%	1.04%	1.0	0.73%	0.56%
6m1y	0.59%	-13	0.33%	0.63%	1.9	0.43%	0.53%
6m2y	**0.69%**	**-16**	**0.37%**	**0.70%**	**2.2**	**0.49%**	**0.55%**
6m5y	**0.81%**	**-19**	**0.43%**	**0.79%**	**2.9**	**0.56%**	**0.50%**
6m10y	0.95%	-21	0.53%	0.93%	3.1	0.69%	0.52%
6m20y	1.05%	-21	0.63%	1.05%	3.1	0.80%	0.56%
6m30y	1.05%	-22	0.61%	1.04%	3.0	0.78%	0.56%
9m1y	0.60%	-17	0.26%	0.63%	1.9	0.43%	0.48%
9m2y	0.71%	-20	0.31%	0.70%	2.0	0.52%	0.52%
9m5y	0.82%	-23	0.36%	0.79%	2.3	0.62%	0.49%
9m10y	0.96%	-26	0.44%	0.93%	2.4	0.74%	0.52%
9m20y	1.06%	-26	0.54%	1.05%	2.5	0.83%	0.56%
9m30y	1.05%	-26	0.53%	1.04%	2.5	0.84%	0.56%

GBP 1x1.5 Receiver spreads

Option	Fwd rate	Moneyness of lower strike (ATM +)	Analysis on expiry		Analysis in three months		
			Breakeven rate on expiry	Spot Rate	3m carry (bp of underlying swap)	Rate Level at which trade loses in 3m	Lowest rate level in last 1yr
3m1y	0.60%	-6	0.42%	0.63%	0.0	0.42%	0.61%
3m2y	0.69%	-7	0.48%	0.70%	0.0	0.48%	0.60%
3m5y	**0.79%**	**-8**	**0.55%**	**0.79%**	**1.4**	**0.55%**	**0.52%**
3m10y	0.94%	-9	0.67%	0.93%	1.7	0.67%	0.53%
3m20y	1.05%	-10	0.75%	1.05%	1.0	0.75%	0.56%
3m30y	1.05%	-10	0.75%	1.04%	1.0	0.75%	0.56%
6m1y	0.59%	-8	0.35%	0.63%	1.1	0.44%	0.53%
6m2y	0.69%	-10	0.39%	0.70%	1.3	0.50%	0.55%
6m5y	**0.81%**	**-12**	**0.45%**	**0.79%**	**1.7**	**0.56%**	**0.50%**
6m10y	0.95%	-13	0.56%	0.93%	1.8	0.70%	0.52%
6m20y	1.05%	-13	0.66%	1.05%	1.8	0.81%	0.56%
6m30y	1.05%	-13	0.66%	1.04%	1.8	0.81%	0.56%
9m1y	0.60%	-10	0.30%	0.63%	1.1	0.44%	0.48%
9m2y	0.71%	-12	0.35%	0.70%	1.2	0.53%	0.52%
9m5y	0.82%	-14	0.40%	0.79%	1.4	0.63%	0.49%
9m10y	0.96%	-16	0.48%	0.93%	1.4	0.75%	0.52%
9m20y	1.06%	-16	0.58%	1.05%	1.4	0.84%	0.56%
9m30y	1.05%	-16	0.57%	1.04%	1.5	0.85%	0.56%

Note: Rate level at which trade loses in 1y has been calculated under assumptions of constant vol. As of 13 January 2020. Source: Barclays Research

GBP zero-cost receiver spreads (mid expiry)

GBP 1x2 Receiver spreads

Option	Fwd rate	Moneyness of lower strike (ATM +)	Analysis on expiry		Analysis in one year		
			Breakeven rate on expiry	Spot Rate	1y carry (bp of underlying swap)	Rate Level at which trade loses in 1y	Lowest rate level in last 2 yrs
1y1y	0.62%	-20	0.22%	0.63%	0.0	0.22%	0.61%
1y2y	0.73%	-23	0.27%	0.70%	2.1	0.27%	0.60%
1y5y	0.83%	-27	0.29%	0.79%	4.6	0.29%	0.52%
1y10y	0.97%	-29	0.39%	0.92%	4.6	0.39%	0.53%
1y20y	1.06%	-30	0.46%	1.04%	1.4	0.46%	0.56%
1y30y	1.05%	-30	0.45%	1.04%	0.8	0.45%	0.56%
2y1y	**0.69%**	**-31**	**0.07%**	**0.63%**	**5.8**	**0.26%**	**0.44%**
2y2y	**0.81%**	**-34**	**0.13%**	**0.70%**	**6.0**	**0.34%**	**0.48%**
2y5y	0.90%	-39	0.12%	0.79%	6.2	0.40%	0.48%
2y10y	1.02%	-41	0.20%	0.92%	6.0	0.53%	0.52%
2y20y	1.08%	-41	0.26%	1.04%	5.8	0.60%	0.56%
2y30y	1.06%	-40	0.26%	1.04%	5.6	0.61%	0.56%
3y1y	0.77%	-41	-0.05%	0.63%	5.8	0.32%	0.40%
3y2y	0.88%	-43	0.02%	0.70%	5.1	0.47%	0.47%
3y5y	0.96%	-48	0.00%	0.79%	5.0	0.54%	0.48%
3y10y	1.07%	-49	0.09%	0.92%	4.8	0.66%	0.53%
3y20y	1.10%	-49	0.12%	1.04%	4.4	0.72%	0.56%
3y30y	1.07%	-48	0.11%	1.04%	4.1	0.72%	0.56%

GBP 1x1.5 Receiver spreads

Option	Fwd rate	Moneyness of lower strike (ATM +)	Analysis on expiry		Analysis in one year		
			Breakeven rate on expiry	Spot Rate	1y carry (bp of underlying swap)	Rate Level at which trade loses in 1y	Lowest rate level in last 2 yrs
1y1y	0.62%	-12	0.26%	0.63%	0.0	0.26%	0.61%
1y2y	0.72%	-14	0.30%	0.70%	2.2	0.30%	0.60%
1y5y	**0.83%**	**-17**	**0.32%**	**0.79%**	**4.3**	**0.32%**	**0.52%**
1y10y	**0.97%**	**-18**	**0.43%**	**0.92%**	**4.4**	**0.43%**	**0.53%**
1y20y	1.06%	-18	0.52%	1.04%	1.8	0.52%	0.56%
1y30y	1.05%	-18	0.51%	1.04%	1.0	0.51%	0.56%
2y1y	**0.69%**	**-19**	**0.12%**	**0.63%**	**3.6**	**0.28%**	**0.44%**
2y2y	**0.81%**	**-21**	**0.18%**	**0.70%**	**3.6**	**0.36%**	**0.48%**
2y5y	**0.90%**	**-24**	**0.18%**	**0.79%**	**3.7**	**0.42%**	**0.48%**
2y10y	1.02%	-25	0.27%	0.92%	3.6	0.56%	0.52%
2y20y	1.08%	-25	0.33%	1.04%	3.5	0.63%	0.56%
2y30y	1.06%	-25	0.31%	1.04%	3.3	0.62%	0.56%
3y1y	**0.77%**	**-25**	**0.02%**	**0.63%**	**3.4**	**0.35%**	**0.40%**
3y2y	0.88%	-26	0.10%	0.70%	3.0	0.49%	0.47%
3y5y	0.96%	-29	0.09%	0.79%	2.9	0.56%	0.48%
3y10y	1.07%	-30	0.17%	0.92%	2.8	0.68%	0.53%
3y20y	1.10%	-30	0.20%	1.04%	2.6	0.73%	0.56%
3y30y	1.07%	-29	0.20%	1.04%	2.4	0.74%	0.56%

Note: Rate level at which trade loses in 1y has been calculated under assumptions of constant vol. As of 13 January 2020. Source: Barclays Research

Optimal expiry/tenor selection for zero-cost payer spreads

Restricted - External

Methodology

- We construct zero-cost 1x2 and 1x1.5 payer spreads for up to 3y expiries along the USD, EUR and GBP surfaces.
  - For each spread, one leg is struck ATM
  - The higher strike is selected so that the trade is zero cost
- We use the following metrics to evaluate each structure. The metrics are shown in the tables that follow.
  - **3m/1y Carry:** Calculated under a scenario in which the curve remains unchanged over time, forward rates and vols roll to spot. A higher carry is desirable, as it implies a higher expected return under the unchanged curve scenario (in **blue**). We calculate 3m carry for options with less than 1y expiry and 1y carry for longer expiry options.
  - **Rate above which trade loses over a 3m/1y horizon:** Should be high compared with highest levels for that particular rate over the past one/two years (in **blue**). This metric evaluates the trade on the basis of its historical downside.
  - **Breakeven rate on expiry:** Should be high compared with the current spot rate (in **grey**). This metric evaluates the trade, from a terminal perspective, on the basis of its downside relative to current levels.
- We highlight tenor/expiry combinations that do the best on all three metrics.

Restricted - External

USD zero-cost payer spreads (short expiry)

USD 1x2 Payer spreads

Option	Fwd rate	Moneyness of higher strike (ATM +)	Analysis on expiry		Analysis in three months		
			Breakeven rate on expiry	Spot Rate	3m carry (bp of underlying swap)	Rate Level at which trade loses in 3m	Highest rate level in last 1yr
3m1y	1.66%	8	1.82%	1.73%	6.3	1.82%	2.77%
3m2y	1.60%	11	1.82%	1.64%	3.1	1.82%	2.76%
3m5y	1.64%	14	1.92%	1.64%	0.3	1.92%	2.71%
3m10y	1.80%	15	2.10%	1.79%	0.0	2.10%	2.81%
3m20y	1.96%	15	2.26%	1.96%	0.0	2.26%	2.92%
3m30y	1.98%	15	2.28%	1.98%	0.0	2.28%	2.92%
6m1y	1.61%	13	1.87%	1.73%	3.3	1.81%	2.77%
6m2y	1.58%	16	1.90%	1.64%	3.5	1.80%	2.75%
6m5y	1.64%	20	2.04%	1.64%	3.6	1.90%	2.71%
6m10y	**1.81%**	**22**	**2.25%**	**1.79%**	**3.4**	**2.09%**	**2.82%**
6m20y	**1.97%**	**21**	**2.39%**	**1.96%**	**3.5**	**2.23%**	**2.92%**
6m30y	**1.99%**	**21**	**2.41%**	**1.98%**	**3.4**	**2.25%**	**2.92%**
9m1y	1.58%	18	1.94%	1.73%	3.2	1.79%	2.77%
9m2y	1.57%	21	1.99%	1.64%	3.4	1.79%	2.73%
9m5y	1.65%	25	2.15%	1.64%	3.1	1.87%	2.71%
9m10y	1.82%	27	2.36%	1.79%	2.8	2.05%	2.83%
9m20y	1.97%	26	2.49%	1.96%	2.7	2.19%	2.93%
9m30y	1.99%	26	2.51%	1.98%	2.5	2.20%	2.93%

USD 1x1.5 Payer spreads

Option	Fwd rate	Moneyness of higher strike (ATM +)	Analysis on expiry		Analysis in three months		
			Breakeven rate on expiry	Spot Rate	3m carry (bp of underlying swap)	Rate Level at which trade loses in 3m	Highest rate level in last 1yr
3m1y	1.66%	5	1.81%	1.73%	3.7	1.81%	2.77%
3m2y	1.60%	7	1.81%	1.64%	3.2	1.81%	2.76%
3m5y	1.64%	9	1.91%	1.64%	0.1	1.91%	2.71%
3m10y	1.80%	10	2.10%	1.79%	0.0	2.10%	2.81%
3m20y	1.96%	9	2.23%	1.96%	0.0	2.23%	2.92%
3m30y	1.98%	9	2.25%	1.98%	0.0	2.25%	2.92%
6m1y	1.61%	8	1.85%	1.73%	1.9	1.80%	2.77%
6m2y	1.58%	10	1.88%	1.64%	2.1	1.79%	2.75%
6m5y	1.64%	13	2.03%	1.64%	2.1	1.90%	2.71%
6m10y	**1.81%**	**14**	**2.23%**	**1.79%**	**2.1**	**2.08%**	**2.82%**
6m20y	**1.97%**	**13**	**2.36%**	**1.96%**	**2.1**	**2.22%**	**2.92%**
6m30y	**1.99%**	**13**	**2.38%**	**1.98%**	**2.1**	**2.24%**	**2.92%**
9m1y	1.58%	11	1.91%	1.73%	1.8	1.78%	2.77%
9m2y	1.57%	13	1.96%	1.64%	1.9	1.78%	2.73%
9m5y	1.65%	16	2.13%	1.64%	1.8	1.87%	2.71%
9m10y	1.82%	17	2.33%	1.79%	1.7	2.05%	2.83%
9m20y	1.97%	16	2.45%	1.96%	1.6	2.18%	2.93%
9m30y	1.99%	16	2.47%	1.98%	1.5	2.20%	2.93%

Note: Rate level at which trade loses in 1y has been calculated under assumptions of constant vol. As of 13 January 2020. Source: Barclays Research

USD zero-cost payer spreads (mid expiry)

USD 1x2 Payer spreads

Option	Fwd rate	Moneyness of higher strike (ATM +)	Analysis on expiry		Analysis in one year		
			Breakeven rate on expiry	Spot Rate	1y carry (bp of underlying swap)	Rate Level at which trade loses in 1y	Highest rate level in last 2 yrs
1y1y	**1.55%**	**23**	**2.01%**	**1.73%**	**17.2**	**2.01%**	**2.93%**
1y2y	1.57%	26	2.09%	1.64%	7.4	2.09%	3.15%
1y5y	1.66%	30	2.26%	1.64%	0.0	2.26%	3.21%
1y10y	1.83%	31	2.45%	1.79%	0.0	2.45%	3.28%
1y20y	1.98%	30	2.58%	1.96%	0.0	2.58%	3.36%
1y30y	1.99%	29	2.57%	1.98%	0.0	2.57%	3.34%
2y1y	1.58%	41	2.40%	1.73%	9.8	2.23%	3.31%
2y2y	1.61%	43	2.47%	1.64%	9.0	2.25%	3.32%
2y5y	1.72%	44	2.60%	1.64%	7.5	2.29%	3.29%
2y10y	**1.89%**	**44**	**2.77%**	**1.79%**	**6.6**	**2.41%**	**3.34%**
2y20y	2.01%	41	2.83%	1.96%	6.5	2.49%	3.38%
2y30y	2.00%	41	2.82%	1.98%	6.4	2.49%	3.36%
3y1y	1.64%	55	2.74%	1.73%	8.2	2.23%	3.30%
3y2y	1.68%	55	2.78%	1.64%	7.6	2.22%	3.29%
3y5y	1.80%	55	2.90%	1.64%	6.6	2.28%	3.29%
3y10y	1.94%	54	3.02%	1.79%	6.1	2.40%	3.35%
3y20y	2.04%	50	3.04%	1.96%	5.2	2.43%	3.39%
3y30y	2.02%	49	3.00%	1.98%	5.1	2.41%	3.36%

USD 1x1.5 Payer spreads

Option	Fwd rate	Moneyness of higher strike (ATM +)	Analysis on expiry		Analysis in one year		
			Breakeven rate on expiry	Spot Rate	1y carry (bp of underlying swap)	Rate Level at which trade loses in 1y	Highest rate level in last 2 yrs
1y1y	**1.55%**	**15**	**2.00%**	**1.73%**	**13.3**	**2.00%**	**2.93%**
1y2y	1.57%	16	2.05%	1.64%	7.4	2.05%	3.15%
1y5y	1.66%	18	2.20%	1.64%	0.0	2.20%	3.21%
1y10y	1.83%	19	2.40%	1.79%	0.0	2.40%	3.28%
1y20y	1.98%	18	2.52%	1.96%	0.0	2.52%	3.36%
1y30y	1.99%	18	2.53%	1.98%	0.0	2.53%	3.34%
2y1y	1.58%	25	2.33%	1.73%	6.1	2.18%	3.31%
2y2y	1.61%	26	2.39%	1.64%	5.6	2.20%	3.32%
2y5y	1.72%	27	2.53%	1.64%	4.6	2.26%	3.29%
2y10y	**1.89%**	**27**	**2.70%**	**1.79%**	**4.1**	**2.39%**	**3.34%**
2y20y	**2.01%**	**25**	**2.76%**	**1.96%**	**3.9**	**2.47%**	**3.38%**
2y30y	2.01%	25	2.76%	1.98%	3.9	2.46%	3.36%
3y1y	1.64%	33	2.63%	1.73%	5.0	2.19%	3.30%
3y2y	1.68%	34	2.70%	1.64%	4.5	2.20%	3.29%
3y5y	1.80%	34	2.82%	1.64%	3.9	2.26%	3.29%
3y10y	1.94%	33	2.93%	1.79%	3.6	2.38%	3.35%
3y20y	2.03%	31	2.96%	1.96%	3.1	2.42%	3.39%
3y30y	2.02%	30	2.92%	1.98%	3.0	2.38%	3.36%

Note: Rate level at which trade loses in 1y has been calculated under assumptions of constant vol. As of 13 January 2020. Source: Barclays Research

EUR zero-cost payer spreads (short expiry)

EUR 1x2 Payer spreads

Option	Fwd rate	Moneyness of higher strike (ATM +)	Analysis on expiry		Analysis in three months		
			Breakeven rate on expiry	Spot Rate	3m carry (bp of underlying swap)	Rate Level at which trade loses in 3m	Highest rate level in last 1yr
3m1y	-0.39%	4	-0.31%	-0.39%	0.0	-0.31%	-0.28%
3m2y	-0.28%	5	-0.18%	-0.30%	0.0	-0.18%	-0.13%
3m5y	-0.11%	9	0.07%	-0.14%	0.0	0.07%	0.21%
3m10y	0.21%	12	0.45%	0.18%	0.0	0.45%	0.81%
3m20y	0.59%	12	0.83%	0.57%	0.0	0.83%	1.34%
3m30y	0.62%	12	0.86%	0.61%	0.0	0.86%	1.40%
6m1y	-0.38%	6	-0.26%	-0.39%	0.4	-0.29%	-0.26%
6m2y	**-0.26%**	**7**	**-0.12%**	**-0.30%**	**0.7**	**-0.15%**	**-0.09%**
6m5y	**-0.09%**	**13**	**0.17%**	**-0.14%**	**1.5**	**0.09%**	**0.27%**
6m10y	0.23%	17	0.57%	0.18%	1.7	0.45%	0.86%
6m20y	0.60%	17	0.94%	0.57%	2.4	0.82%	1.37%
6m30y	0.63%	17	0.97%	0.61%	2.4	0.84%	1.41%
9m1y	-0.36%	8	-0.20%	-0.39%	0.6	-0.26%	-0.23%
9m2y	-0.24%	10	-0.04%	-0.30%	0.7	-0.12%	-0.05%
9m5y	-0.06%	17	0.28%	-0.14%	1.3	0.10%	0.32%
9m10y	0.26%	21	0.68%	0.18%	1.5	0.44%	0.91%
9m20y	0.62%	21	1.04%	0.57%	2.0	0.79%	1.39%
9m30y	0.64%	21	1.06%	0.61%	2.1	0.82%	1.43%

EUR 1x1.5 Payer spreads

Option	Fwd rate	Moneyness of higher strike (ATM +)	Analysis on expiry		Analysis in three months		
			Breakeven rate on expiry	Spot Rate	3m carry (bp of underlying swap)	Rate Level at which trade loses in 3m	Highest rate level in last 1yr
3m1y	-0.39%	2	-0.33%	-0.39%	0.0	-0.33%	-0.28%
3m2y	-0.28%	3	-0.19%	-0.30%	0.0	-0.19%	-0.13%
3m5y	-0.11%	6	0.07%	-0.14%	0.0	0.07%	0.21%
3m10y	0.21%	7	0.42%	0.18%	0.0	0.42%	0.81%
3m20y	0.59%	8	0.83%	0.57%	0.0	0.83%	1.34%
3m30y	0.62%	7	0.83%	0.61%	0.0	0.83%	1.40%
6m1y	-0.38%	3	-0.29%	-0.39%	0.4	-0.31%	-0.26%
6m2y	**-0.26%**	**4**	**-0.14%**	**-0.30%**	**0.5**	**-0.17%**	**-0.09%**
6m5y	**-0.09%**	**8**	**0.15%**	**-0.14%**	**0.9**	**0.08%**	**0.27%**
6m10y	0.23%	10	0.53%	0.18%	1.1	0.43%	0.86%
6m20y	0.60%	10	0.90%	0.57%	1.5	0.80%	1.37%
6m30y	0.63%	10	0.93%	0.61%	1.5	0.82%	1.41%
9m1y	-0.36%	5	-0.21%	-0.39%	0.4	-0.26%	-0.23%
9m2y	-0.24%	6	-0.06%	-0.30%	0.4	-0.13%	-0.05%
9m5y	-0.06%	10	0.24%	-0.14%	0.8	0.08%	0.32%
9m10y	0.26%	12	0.62%	0.18%	1.0	0.42%	0.91%
9m20y	0.62%	13	1.01%	0.57%	1.2	0.79%	1.39%
9m30y	0.64%	13	1.03%	0.61%	1.2	0.82%	1.43%

Note: Rate level at which trade loses in 1y has been calculated under assumptions of constant vol. As of 13 January 2020. Source: Barclays Research

EUR zero-cost payer spreads (mid expiry)

EUR 1x2 Payer spreads

Option	Fwd rate	Moneyness of higher strike (ATM +)	Analysis on expiry		Analysis in one year		
			Breakeven rate on expiry	Spot Rate	1y carry (bp of underlying swap)	Rate Level at which trade loses in 1y	Highest rate level in last 2 yrs
1y1y	-0.34%	10	-0.14%	-0.39%	0.0	-0.14%	-0.26%
1y2y	-0.22%	12	0.02%	-0.30%	0.0	0.02%	-0.09%
1y5y	-0.03%	20	0.37%	-0.14%	0.0	0.37%	0.50%
1y10y	0.29%	24	0.77%	0.17%	0.0	0.77%	1.16%
1y20y	0.63%	25	1.13%	0.57%	0.0	1.13%	1.64%
1y30y	0.64%	24	1.12%	0.61%	0.0	1.12%	1.68%
2y1y	-0.24%	21	0.18%	-0.39%	1.2	0.12%	0.02%
2y2y	-0.10%	23	0.36%	-0.30%	1.8	0.26%	0.28%
2y5y	0.09%	30	0.69%	-0.14%	2.7	0.48%	0.86%
2y10y	0.40%	34	1.08%	0.17%	3.3	0.80%	1.41%
2y20y	0.68%	35	1.38%	0.57%	4.5	1.11%	1.76%
2y30y	0.67%	35	1.37%	0.61%	5.1	1.10%	1.76%
3y1y	**-0.12%**	**34**	**0.56%**	**-0.39%**	**3.1**	**0.37%**	**0.44%**
3y2y	**0.02%**	**36**	**0.74%**	**-0.30%**	**3.4**	**0.50%**	**0.73%**
3y5y	0.22%	41	1.04%	-0.14%	4.0	0.66%	1.21%
3y10y	0.52%	43	1.38%	0.17%	4.3	0.90%	1.64%
3y20y	0.73%	43	1.59%	0.57%	4.7	1.11%	1.87%
3y30y	0.69%	43	1.55%	0.61%	4.5	1.06%	1.83%

EUR 1x1.5 Payer spreads

Option	Fwd rate	Moneyness of higher strike (ATM +)	Analysis on expiry		Analysis in one year		
			Breakeven rate on expiry	Spot Rate	1y carry (bp of underlying swap)	Rate Level at which trade loses in 1y	Highest rate level in last 2 yrs
1y1y	-0.34%	6	-0.16%	-0.39%	0.0	-0.16%	-0.26%
1y2y	-0.22%	7	-0.01%	-0.30%	0.0	-0.01%	-0.09%
1y5y	-0.03%	12	0.33%	-0.14%	0.0	0.33%	0.50%
1y10y	0.29%	14	0.71%	0.17%	0.0	0.71%	1.16%
1y20y	0.63%	15	1.08%	0.57%	0.0	1.08%	1.64%
1y30y	0.64%	15	1.09%	0.61%	0.0	1.09%	1.68%
2y1y	-0.24%	12	0.12%	-0.39%	1.1	0.08%	0.02%
2y2y	-0.10%	14	0.32%	-0.30%	1.2	0.25%	0.28%
2y5y	0.09%	18	0.63%	-0.14%	1.8	0.46%	0.86%
2y10y	0.40%	21	1.03%	0.17%	2.1	0.80%	1.41%
2y20y	0.68%	21	1.31%	0.57%	3.0	1.09%	1.76%
2y30y	0.67%	21	1.30%	0.61%	3.3	1.08%	1.76%
3y1y	**-0.12%**	**20**	**0.48%**	**-0.39%**	**2.1**	**0.33%**	**0.44%**
3y2y	**0.02%**	**21**	**0.65%**	**-0.30%**	**2.3**	**0.45%**	**0.73%**
3y5y	0.22%	25	0.97%	-0.14%	2.4	0.64%	1.21%
3y10y	0.52%	26	1.30%	0.17%	2.6	0.88%	1.64%
3y20y	0.73%	26	1.51%	0.57%	2.8	1.09%	1.87%
3y30y	0.69%	26	1.47%	0.61%	2.7	1.04%	1.83%

Note: Rate level at which trade loses in 1y has been calculated under assumptions of constant vol. As of 13 January 2020. Source: Barclays Research

GBP zero-cost payer spreads (short expiry)

GBP 1x2 Payer spreads

Option	Fwd rate	Moneyness of higher strike (ATM +)	Analysis on expiry		Analysis in three months		
			Breakeven rate on expiry	Spot Rate	3m carry (bp of underlying swap)	Rate Level at which trade loses in 3m	Highest rate level in last 1yr
3m1y	**0.60%**	**9**	**0.78%**	**0.63%**	**3.0**	**0.78%**	**1.00%**
3m2y	0.69%	11	0.91%	0.70%	1.4	0.91%	1.18%
3m5y	0.79%	13	1.05%	0.79%	0.0	1.05%	1.35%
3m10y	0.94%	15	1.24%	0.93%	0.0	1.24%	1.52%
3m20y	1.05%	15	1.35%	1.05%	0.0	1.35%	1.66%
3m30y	1.05%	16	1.37%	1.04%	0.0	1.37%	1.66%
6m1y	0.59%	13	0.85%	0.63%	2.2	0.77%	1.06%
6m2y	0.69%	16	1.01%	0.70%	2.4	0.91%	1.22%
6m5y	0.81%	19	1.19%	0.79%	2.8	1.04%	1.37%
6m10y	0.95%	21	1.37%	0.93%	3.1	1.21%	1.54%
6m20y	1.05%	22	1.49%	1.05%	3.2	1.33%	1.66%
6m30y	1.05%	22	1.49%	1.04%	3.3	1.33%	1.67%
9m1y	0.60%	17	0.94%	0.63%	2.1	0.78%	1.11%
9m2y	0.71%	20	1.11%	0.70%	2.2	0.90%	1.26%
9m5y	0.82%	23	1.28%	0.79%	2.6	1.02%	1.40%
9m10y	0.96%	26	1.48%	0.93%	2.6	1.19%	1.56%
9m20y	1.06%	27	1.60%	1.05%	2.5	1.29%	1.67%
9m30y	1.05%	27	1.59%	1.04%	2.6	1.28%	1.67%

GBP 1x1.5 Payer spreads

Option	Fwd rate	Moneyness of higher strike (ATM +)	Analysis on expiry		Analysis in three months		
			Breakeven rate on expiry	Spot Rate	3m carry (bp of underlying swap)	Rate Level at which trade loses in 3m	Highest rate level in last 1yr
3m1y	**0.60%**	**6**	**0.78%**	**0.64%**	**2.8**	**0.78%**	**1.00%**
3m2y	0.69%	7	0.90%	0.70%	1.4	0.90%	1.18%
3m5y	0.79%	8	1.03%	0.79%	0.0	1.03%	1.35%
3m10y	0.94%	9	1.21%	0.93%	0.0	1.21%	1.52%
3m20y	1.05%	10	1.35%	1.05%	0.0	1.35%	1.66%
3m30y	1.05%	10	1.35%	1.04%	0.0	1.35%	1.66%
6m1y	0.59%	8	0.83%	0.64%	1.3	0.76%	1.06%
6m2y	0.69%	10	0.99%	0.70%	1.5	0.90%	1.22%
6m5y	0.81%	12	1.17%	0.79%	1.7	1.04%	1.37%
6m10y	0.95%	13	1.34%	0.93%	1.9	1.20%	1.54%
6m20y	1.05%	13	1.44%	1.05%	1.9	1.31%	1.66%
6m30y	1.05%	14	1.47%	1.04%	1.9	1.33%	1.67%
9m1y	0.60%	10	0.90%	0.64%	1.3	0.76%	1.11%
9m2y	0.71%	12	1.07%	0.70%	1.3	0.88%	1.26%
9m5y	0.82%	14	1.24%	0.79%	1.5	1.02%	1.40%
9m10y	0.96%	16	1.44%	0.93%	1.5	1.18%	1.56%
9m20y	1.06%	16	1.54%	1.05%	1.5	1.27%	1.67%
9m30y	1.05%	17	1.56%	1.04%	1.5	1.28%	1.67%

Note: Rate level at which trade loses in 1y has been calculated under assumptions of constant vol. As of 13 January 2020. Source: Barclays Research

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GBP zero-cost payer spreads (mid expiry)

GBP 1x2 Payer spreads

Option	Fwd rate	Moneyness of higher strike (ATM +)	Analysis on expiry		Analysis in one year		
			Breakeven rate on expiry	Spot Rate	1y carry (bp of underlying swap)	Rate Level at which trade loses in 1y	Highest rate level in last 2 yrs
1y1y	0.62%	21	1.04%	0.63%	1.2	1.04%	1.01%
1y2y	0.73%	23	1.19%	0.70%	0.0	1.19%	1.24%
1y5y	0.84%	28	1.40%	0.79%	0.0	1.40%	1.56%
1y10y	0.97%	30	1.57%	0.93%	0.0	1.57%	1.80%
1y20y	1.06%	31	1.68%	1.04%	0.0	1.68%	1.91%
1y30y	1.05%	31	1.67%	1.04%	0.0	1.67%	1.90%
2y1y	**0.69%**	**36**	**1.41%**	**0.63%**	**5.5**	**1.25%**	**1.34%**
2y2y	**0.81%**	**38**	**1.57%**	**0.70%**	**5.4**	**1.36%**	**1.53%**
2y5y	0.90%	41	1.72%	0.79%	6.0	1.45%	1.75%
2y10y	1.03%	43	1.89%	0.93%	5.9	1.55%	1.91%
2y20y	1.08%	42	1.92%	1.04%	5.7	1.57%	1.97%
2y30y	1.07%	42	1.91%	1.04%	5.5	1.54%	1.93%
3y1y	0.77%	49	1.75%	0.63%	5.3	1.30%	1.58%
3y2y	0.88%	50	1.88%	0.70%	5.5	1.40%	1.74%
3y5y	0.96%	52	2.00%	0.79%	5.4	1.44%	1.87%
3y10y	1.07%	52	2.11%	0.93%	5.0	1.50%	1.99%
3y20y	1.10%	51	2.12%	1.04%	4.8	1.51%	2.00%
3y30y	1.07%	51	2.09%	1.04%	4.6	1.48%	1.95%

GBP 1x1.5 Payer spreads

Option	Fwd rate	Moneyness of higher strike (ATM +)	Analysis on expiry		Analysis in one year		
			Breakeven rate on expiry	Spot Rate	1y carry (bp of underlying swap)	Rate Level at which trade loses in 1y	Highest rate level in last 2 yrs
1y1y	0.62%	13	1.01%	0.63%	1.3	1.01%	1.01%
1y2y	0.73%	14	1.15%	0.70%	0.0	1.15%	1.24%
1y5y	0.83%	17	1.34%	0.79%	0.0	1.34%	1.56%
1y10y	0.97%	18	1.51%	0.92%	0.0	1.51%	1.80%
1y20y	1.06%	19	1.63%	1.04%	0.0	1.63%	1.91%
1y30y	1.05%	19	1.62%	1.04%	0.0	1.62%	1.90%
2y1y	**0.69%**	**22**	**1.35%**	**0.63%**	**3.5**	**1.22%**	**1.34%**
2y2y	**0.81%**	**23**	**1.50%**	**0.70%**	**3.5**	**1.33%**	**1.53%**
2y5y	0.90%	25	1.65%	0.79%	3.7	1.41%	1.75%
2y10y	1.02%	26	1.80%	0.92%	3.6	1.52%	1.91%
2y20y	1.08%	26	1.86%	1.04%	3.4	1.55%	1.97%
2y30y	1.06%	26	1.84%	1.04%	3.3	1.52%	1.93%
3y1y	0.77%	30	1.67%	0.63%	3.2	1.29%	1.58%
3y2y	0.88%	30	1.78%	0.70%	3.4	1.37%	1.74%
3y5y	0.96%	31	1.89%	0.79%	3.3	1.40%	1.87%
3y10y	1.07%	32	2.03%	0.92%	3.0	1.48%	1.99%
3y20y	1.10%	31	2.03%	1.04%	2.8	1.49%	2.00%
3y30y	1.07%	31	2.00%	1.04%	2.7	1.45%	1.95%

Note: Rate level at which trade loses in 1y has been calculated under assumptions of constant vol. As of 13 January 2020. Source: Barclays Research

Selection of optimal long-duration structures

Restricted - External

Methodology

- We analyse various long duration structures for 1y and longer expiries along the USD, EUR and GBP surfaces.
  - **Receiver spreads:** One receiver leg is struck ATM, while the strike of the second leg is such that the price of the receiver spread is 50% of ATM receiver.
  - **Short H.S. payers:** Strike of the payer is such that the premium is 50% of ATM payer.
  - **Rec. spread + H.S. payer (Seagull):** The above two structures are combined to create a roughly zero-cost long-duration structure.
- Notional of each structure is normalised, so that they all have the same initial delta.
- We use the following metrics to evaluate each structure. The metrics are shown in the tables that follow.
  - **1y Carry:** Calculated under a scenario in which the curve remains unchanged over time, forward rates and vols roll to spot. A higher carry is desirable (in **blue**).
  - **Gain in 50bp instantaneous rally:** Indicates the potential upside in the near term if rates were to rally lower (in **blue**).
  - **Loss in 50bp instantaneous sell-off:** Indicates the potential downside in the near term if rates were to sell off (in **grey**).
- We highlight the structures and tenor/expiry combinations that fare the best on all three metrics.

Restricted - External

Long duration strategies in USD

Option	Fwd rate	Receiver spread				High-strike payer				Seagull		
		Strike of LS option (ATM +)	Carry in one year ($ mn)	Gain in a 50bp rally ($ mn)	Loss in a 50bp sell-off ($ mn)	Strike of HS option (ATM +)	Carry in one year ($ mn)	Gain in a 50bp rally ($ mn)	Loss in a 50bp sell-off ($ mn)	Carry in one year ($ mn)	Gain in a 50bp rally ($ mn)	Loss in a 50bp sell-off ($ mn)
1y2y	1.57%	-34	-5.6	5.3	-3.9	27	3.7	3.0	-7.7	-0.1	3.9	-6.2
1y3y	1.59%	-34	-5.7	5.3	-3.9	28	3.8	3.0	-7.6	0.0	3.9	-6.1
1y5y	1.66%	-35	-5.0	5.3	-4.0	31	4.1	3.1	-7.5	0.4	4.0	-6.1
1y10y	1.83%	-35	-4.2	5.3	-4.0	32	4.2	3.2	-7.3	0.8	4.0	-5.9
1y20y	1.98%	-34	-4.5	5.4	-3.9	30	4.1	3.1	-7.2	0.5	4.1	-5.8
1y30y	1.99%	-34	-4.6	5.5	-3.8	30	4.1	3.1	-7.2	0.3	4.2	-5.7
2y2y	1.61%	-50	-0.7	5.3	-4.3	43	3.8	3.6	-6.7	2.0	4.3	-5.7
2y3y	1.65%	-50	-0.4	5.3	-4.3	44	3.8	3.6	-6.7	2.1	4.3	-5.7
2y5y	1.72%	-50	-0.1	5.3	-4.3	45	3.6	3.7	-6.6	2.0	4.3	-5.7
2y10y	1.89%	-50	-0.0	5.4	-4.3	44	3.3	3.7	-6.6	1.9	4.4	-5.6
2y20y	2.01%	-47	-0.3	5.5	-4.2	42	2.9	3.6	-6.5	1.5	4.4	-5.5
2y30y	2.01%	-46	-0.5	5.6	-4.1	41	2.9	3.7	-6.5	1.4	4.5	-5.4
3y2y	1.68%	-60	-0.1	5.3	-4.5	56	3.3	3.9	-6.3	1.9	4.5	-5.6
3y3y	1.72%	-60	0.1	5.3	-4.5	56	3.2	3.9	-6.3	1.9	4.5	-5.6
3y5y	1.80%	-60	0.2	5.3	-4.5	55	3.0	3.9	-6.3	1.9	4.5	-5.5
3y10y	1.95%	-59	0.2	5.4	-4.4	54	2.8	3.9	-6.2	1.7	4.5	-5.5
3y20y	2.04%	-56	-0.1	5.5	-4.3	50	2.2	3.9	-6.2	**1.2**	**4.6**	**-5.4**
3y30y	2.03%	-54	-0.2	5.6	-4.2	50	2.1	3.9	-6.2	**1.1**	**4.7**	**-5.3**

Note: Each structure has been normalised, so that the initial delta (normal) is $100k/bp. Gain/loss in rally/sell-off have been calculated under assumptions of constant vol). As of 10 January 2020.
Source: Barclays Research

Long duration strategies in EUR

Option	Fwd rate	Receiver spread				High-strike payer				Seagull		
		Strike of LS option (ATM +)	Carry in one year (€ mn)	Gain in a 50bp rally (€ mn)	Loss in a 50bp sell-off (€ mn)	Strike of HS option (ATM +)	Carry in one year (€ mn)	Gain in a 50bp rally (€ mn)	Loss in a 50bp sell-off (€ mn)	Carry in one year (€ mn)	Gain in a 50bp rally (€ mn)	Loss in a 50bp sell-off (€ mn)
1y2y	-0.23%	-10	1.8	3.1	-2.2	12	1.4	1.4	-11.4	1.6	2.1	-7.9
1y3y	-0.17%	-13	1.9	3.7	-2.6	15	1.7	1.7	-10.5	1.8	2.5	-7.3
1y5y	-0.05%	-17	1.8	4.3	-3.2	20	2.3	2.2	-9.3	2.1	3.0	-6.8
1y10y	0.26%	-23	1.1	4.9	-3.5	24	3.0	2.6	-8.2	2.2	3.5	-6.3
1y20y	0.60%	-28	-1.9	5.3	-3.5	25	3.3	2.8	-7.7	1.1	3.8	-5.9
1y30y	0.61%	-28	-3.0	5.4	-3.5	25	3.4	2.8	-7.6	0.6	3.9	-5.8
2y2y	-0.12%	-20	1.4	4.5	-3.6	24	2.4	2.5	-8.6	2.0	3.3	-6.6
2y3y	-0.05%	-22	1.3	4.7	-3.7	26	2.5	2.7	-8.2	2.1	3.5	-6.4
2y5y	0.07%	-27	1.2	4.9	-3.9	30	2.7	3.0	-7.6	2.1	3.7	-6.1
2y10y	0.38%	-33	1.0	5.2	-4.0	34	2.8	3.2	-7.1	2.1	4.0	-5.9
2y20y	0.66%	-38	-0.1	5.4	-4.0	35	2.7	3.3	-6.8	1.5	4.2	-5.6
2y30y	0.64%	-39	-0.5	5.6	-3.9	35	2.6	3.4	-6.7	1.2	4.4	-5.5
3y2y	0.01%	-29	1.2	4.9	-4.1	36	2.9	3.2	-7.3	2.3	3.9	-6.1
3y3y	0.07%	-32	1.1	5.0	-4.2	39	3.0	3.3	-7.1	**2.2**	**4.0**	**-5.9**
3y5y	0.20%	-35	1.2	5.1	-4.3	41	2.9	3.4	-6.9	**2.2**	**4.1**	**-5.8**
3y10y	0.49%	-42	0.9	5.3	-4.2	44	2.9	3.6	-6.6	**2.0**	**4.3**	**-5.6**
3y20y	0.71%	-46	0.0	5.4	-4.2	44	2.4	3.7	-6.4	1.4	4.4	-5.4
3y30y	0.66%	-46	-0.3	5.6	-4.1	44	2.2	3.7	-6.4	1.1	4.6	-5.4

Note: Each structure has been normalised, so that the initial delta (normal) is €100k/bp. Gain/loss in rally/sell-off have been calculated under assumptions of constant vol). As of 10 January 2020.
Source: Barclays Research

Long duration strategies in GBP

Option	Fwd rate	Receiver spread				High-strike payer				Seagull		
		Strike of LS option (ATM +)	Carry in one year (£ mn)	Gain in a 50bp rally (£ mn)	Loss in a 50bp sell-off (£ mn)	Strike of HS option (ATM +)	Carry in one year (£ mn)	Gain in a 50bp rally (£ mn)	Loss in a 50bp sell-off (£ mn)	Carry in one year (£ mn)	Gain in a 50bp rally (£ mn)	Loss in a 50bp sell-off (£ mn)
1y2y	0.80%	-22	-3.3	4.7	-3.6	23	2.9	2.6	-8.5	0.5	3.4	-6.6
1y3y	0.84%	-24	-2.9	4.9	-3.7	25	3.1	2.7	-8.2	0.7	3.5	-6.4
1y5y	0.89%	-27	-3.3	5.0	-3.8	27	3.4	2.8	-7.9	0.7	3.7	-6.3
1y10y	1.01%	-29	-3.6	5.1	-3.9	30	3.8	3.0	-7.6	0.8	3.8	-6.1
1y20y	1.09%	-29	-4.5	5.2	-3.9	30	3.9	3.1	-7.3	0.5	3.9	-5.9
1y30y	1.08%	-30	-4.7	5.3	-3.8	31	4.0	3.1	-7.2	0.3	4.1	-5.8
2y2y	0.87%	-34	0.1	5.1	-4.2	37	3.1	3.3	-7.2	1.9	4.0	-6.0
2y3y	0.90%	-36	-0.0	5.1	-4.3	39	3.1	3.4	-7.0	1.9	4.1	-5.9
2y5y	0.94%	-38	-0.1	5.2	-4.3	41	3.1	3.4	-6.9	1.8	4.1	-5.9
2y10y	1.05%	-40	-0.2	5.2	-4.3	42	3.0	3.5	-6.7	1.7	4.2	-5.7
2y20y	1.11%	-41	-0.4	5.4	-4.2	42	2.7	3.6	-6.6	1.4	4.3	-5.6
2y30y	1.09%	-40	-0.5	5.5	-4.1	42	2.6	3.6	-6.5	1.3	4.4	-5.5
3y2y	0.93%	-43	0.1	5.1	-4.4	49	2.8	3.7	-6.6	1.7	4.3	-5.7
3y3y	0.95%	-45	-0.0	5.2	-4.4	50	2.7	3.7	-6.5	1.6	4.3	-5.7
3y5y	0.99%	-48	-0.0	5.2	-4.4	52	2.7	3.8	-6.5	**1.6**	**4.4**	**-5.6**
3y10y	1.09%	-49	-0.0	5.3	-4.4	52	2.5	3.8	-6.3	**1.4**	**4.4**	**-5.5**
3y20y	1.12%	-49	-0.3	5.4	-4.3	51	2.2	3.8	-6.3	**1.1**	**4.5**	**-5.4**
3y30y	1.10%	-48	-0.4	5.5	-4.3	51	2.1	3.9	-6.2	**1.0**	**4.6**	**-5.3**

Note: Each structure has been normalised, so that the initial delta (normal) is £100k/bp. Gain/loss in rally/sell-off have been calculated under assumptions of constant vol). As of 10 January 2020.
Source: Barclays Research

Optimal tenor pairs for conditional curve strategies

Methodology

- We compare various options pairs on the following metrics to identify optimal conditional curve strategies.
  - **Vol difference:** Calculated as the difference between ATM implied vols of the two options. A higher spread (positive or negative) implies that curve trades could be attractive in vol space.
  - **1y rate roll-down:** The change in the forward spread in one year, assuming the rate curve remains constant. A positive roll-down indicates that steepeners are likely to carry positively, while a negative number means that flatteners are likely to carry well.
  - **1y beta of rate slope versus rate level:** Calculated from the regression of the rate spread against the average of the rate levels. A positive beta implies that the curve tends to bear-steepen/bull-flatten, while a negative beta is indicative of bear-flattening/bull-steepening.
- Based on these metrics, we identify structures that are likely to carry positively.
- We then evaluate them on the following metrics:
  - **Zero-cost curve level:** Calculated by adjusting the strike of the longer tenor, so as to make the trade premium neutral. The level is then compared with the history of the spot curve (in **blue**).
  - **6m Carry:** Under a scenario in which the curve remains unchanged over time, forward rates and vols roll to spot. A higher carry is desirable (in **blue**).
- We highlight the structures that perform the best on these metrics.

Restricted - External

Conditional curve strategies in USD

Vol Slope (abpv)

Expiry	2y-5y	2y-10y	5y-10y	5y-20y	5y-30y	10y-20y	10y-30y
6m	9.2	11.3	2.1	0.3	-0.5	-1.8	-2.6
1y	5.1	6.3	1.2	-1.4	-2.5	-2.6	-3.7
2y	1.1	0.6	-0.5	-4.1	-5.4	-3.6	-4.9
3y	-0.2	-1.3	-1.1	-5.7	-6.9	-4.5	-5.7
5y	-0.5	-2.0	-1.5	-6.9	-8.3	-5.4	-6.8

Note: Shows the difference in implied vols of longer versus shorter tails. Positive difference: Bull-steepeners/bear-flatteners are attractive. Negative difference: Bull-flatteners/bear-steepeners are attractive

From a vol perspective:

- Bear-steepeners/bull-flatteners offer value across most pairs

From a roll-down perspective:

- Flatteners carry better in short expiries and on pairs involving shorter tenors
- Steepeners carry better in longer expiries and longer tenors

1y curve roll-down (bp)

Expiry	2y-5y	2y-10y	5y-10y	5y-20y	5y-30y	10y-20y	10y-30y
1y	-9.0	-11.3	-2.3	-0.5	0.6	1.8	2.9
2y	-2.3	-1.6	0.7	3.7	5.0	3.0	4.3
3y	-0.5	1.1	1.7	4.7	6.0	3.1	4.3
5y	0.6	3.6	3.0	5.7	6.9	2.7	3.9

Note: Shows the difference between the forward rate curve and the 1y rolled-down rate curve. Positive roll-down: Steepeners likely to carry well. Negative roll-down: Flatteners likely to carry well

1y Beta of slope versus average rate level

Expiry	2y-5y	2y-10y	5y-10y	5y-20y	5y-30y	10y-20y	10y-30y
6m	-2.8	-1.5	1.3	-0.4	-2.0	-1.7	-3.3
1y	-1.2	0.3	1.5	-0.4	-1.9	-2.0	-3.4
2y	2.6	4.7	2.1	-0.3	-1.6	-2.4	-3.7
3y	2.6	4.1	1.5	-1.6	-2.8	-3.1	-4.3
5y	1.0	0.8	-0.2	-4.0	-5.0	-3.9	-4.9

Note: Shows the 1y beta of the rate slope (in bp) versus the average of the two rates (in %). Positive beta: Curve tends to bear-steepen/bull-flatten. Negative beta: Curve tends to bull-steepen/bear-flatten

From a slope vs. rate beta perspective:

- Bull-steepeners/bear-flatteners in longer tenors offer value on this metric

Note: As 10 January 2020. Source for all tables: Barclays Research

Some positive carry conditional curve strategies in USD

USD bear-flatteners

Expiry	Curve	Spot Spread (bp)	Fwd spread(bp)	Zero cost curve (bp)	Carry in 6m (in bp)	1y Beta of slope verus rate level	Steepest spot curve level over the past yr (bp)
6m	2y-5y	0	6	11	6	-3	4
6m	2y-10y	15	22	28	6	-1	21
6m	5y-10y	15	16	17	0	1	22
6m	5y-20y	31	33	33	0	-0	44
1y	2y-5y	0	9	12	1	-1	4
1y	2y-10y	15	26	30	1	1	21
1y	5y-10y	15	17	17	-0	2	22
1y	5y-30y	34	33	32	-1	-2	48

Note: Strike of longer tenor option has been adjusted to make the structure zero cost

- Short expiry 2y-5y and 2y-10y bear flatteners carry the best

- Some 5y expiry bear steepeners can be initiated at inverted curve strike levels

USD bear-steepeners

Expiry	Curve	Spot Spread (bp)	Fwd spread(bp)	Zero cost curve (bp)	Carry in 6m (in bp)	1y Beta of slope verus rate level	Flattest spot curve level over the past yr (bp)
1y	10y-30y	19	16	14	1.2	-3	11
2y	5y-30y	33	28	23	2.4	-1	20
2y	10y-30y	19	12	7	1.9	-4	11
3y	5y-30y	33	23	15	2.1	-3	20
3y	10y-30y	19	8	1	1.6	-4	11
5y	5y-10y	15	10	8	0.6	-0	5
5y	5y-30y	33	9	-3	2.1	-5	20
5y	10y-30y	19	-0	-11	1.4	-5	11

Note: Strike of longer tenor option has been adjusted to make the structure zero cost

Note: As of 10 January 2020. Source for all tables: Barclays Research

Restricted - External

Conditional curve strategies in EUR

Vol Slope (abpv)

Expiry	2y-5y	2y-10y	5y-10y	5y-20y	5y-30y	10y-20y	10y-30y
6m	15.6	26.0	10.5	16.4	16.7	5.9	6.3
1y	13.5	23.5	9.9	15.2	15.9	5.3	5.9
2y	9.8	17.3	7.5	11.3	12.0	3.8	4.5
3y	6.6	12.3	5.8	8.3	8.3	2.5	2.5
5y	3.6	6.8	3.3	3.2	2.4	-0.1	-0.9

Note: Shows the difference in implied vols of longer versus shorter tails. Positive difference: Bull-steepeners/bear-flatteners are attractive. Negative difference: Bull-flatteners/bear-steepeners are attractive

From a vol perspective:

- Bull-steepeners/bear-flatteners offer value for most pairs

From a roll-down perspective:

- Flatteners carry better for pairs involving shorter tenors
- Steepeners are likely to carry better for pairs involving longer tenors

1y curve roll-down (bp)

Expiry	2y-5y	2y-10y	5y-10y	5y-20y	5y-30y	10y-20y	10y-30y
1y	-2.8	-3.4	-0.6	4.8	7.8	5.4	8.4
2y	-0.6	0.1	0.7	6.8	9.6	6.1	8.9
3y	-0.3	1.5	1.8	8.3	10.7	6.5	8.9
5y	-0.1	3.3	3.4	9.7	11.5	6.3	8.2

Note: Shows the difference between the forward rate curve and the 1y rolled-down rate curve. Positive roll-down: Steepeners likely to carry well. Negative roll-down: Flatteners likely to carry well

1y Beta of slope versus average rate level

Expiry	2y-5y	2y-10y	5y-10y	5y-20y	5y-30y	10y-20y	10y-30y
6m	39.1	69.5	31.8	47.6	50.4	16.1	18.9
1y	32.7	59.1	27.1	40.1	42.3	13.1	15.2
2y	24.0	43.6	19.8	28.0	29.2	8.2	9.4
3y	17.9	32.1	14.3	18.8	19.4	4.6	5.1
5y	9.7	15.9	6.2	6.1	6.0	-0.1	-0.2

Note: Shows the 1y beta of the rate slope (in bp) versus the average of the two rates (in %). Positive beta: Curve tends to bear-steepen/ bull-flatten. Negative beta: Curve tends to bull-steepen/bear-flatten

From a slope vs. rate beta perspective:

- Bull-flatteners/bear-steepeners generally offer value on this metric

Note: As of 10 January 2020. Source for all tables: Barclays Research

Some positive carry conditional curve strategies in EUR

EUR bull-steepeners

Expiry	Curve	Spot Spread (bp)	Fwd spread(bp)	Zero cost curve (bp)	Carry in 6m (in bp)	1y Beta of slope verus rate level	Flattest spot curve level over the past yr (bp)
6m	5y-30y	74	70	60	5	51	56
6m	10y-30y	43	39	36	6	19	34
1y	5y-30y	74	66	52	4	42	56
1y	10y-30y	43	35	31	3	15	34
2y	5y-20y	70	58	46	2	28	52
2y	5y-30y	74	57	43	2	29	56
2y	10y-30y	43	26	22	2	10	34
3y	5y-30y	74	46	36	2	20	56
3y	10y-30y	43	17	14	2	5	34

Note: Strike of longer tenor option has been adjusted to make the structure zero cost

- Short expiry 10s30s bull steepeners carry the best
- Risk to the trade comes from a flattening of the curve in a sharp bullish move

- EUR bear flatteners no longer offer positive carry

EUR bear-flatteners

Expiry	Curve	Spot Spread (bp)	Fwd spread(bp)	Zero cost curve (bp)	Carry in 6m (in bp)	1y Beta of slope verus rate level	Steepest spot curve level over the past yr (bp)
6m	2y-5y	16	17	29	0.0	39	33
6m	2y-10y	47	49	70	0.0	69	90
6m	5y-10y	31	32	38	0.0	32	56
1y	2y-5y	16	18	31	-0.5	33	33
1y	2y-10y	47	50	74	-0.5	59	90
1y	5y-10y	31	32	40	0.1	27	56
2y	2y-5y	16	19	31	-0.8	24	33
2y	2y-10y	47	51	73	-1.3	44	90
3y	2y-5y	16	20	30	-0.9	18	33

Note: Strike of longer tenor option has been adjusted to make the structure zero cost

Note: As of 10 January 2020. Source for all tables: Barclays Research

Restricted - External

Conditional curve strategies in GBP

Vol Slope (abpv)

Expiry	2y-5y	2y-10y	5y-10y	5y-20y	5y-30y	10y-20y	10y-30y
6m	10.3	17.0	6.7	8.1	9.0	1.4	2.3
1y	8.3	13.1	4.8	5.8	6.5	1.0	1.7
2y	6.1	8.8	2.7	2.6	2.5	-0.1	-0.3
3y	4.4	5.9	1.5	0.7	0.0	-0.8	-1.4
5y	2.5	2.3	-0.2	-1.6	-2.7	-1.5	-2.6

Note: Shows the difference in implied vols of longer versus shorter tails. Positive difference: Bull-steepeners/bear-flatteners are attractive. Negative difference: Bull-flatteners/bear-steepeners are attractive

From a vol perspective:

- Bull-steepeners/bear-flatteners offer value for most pairs

From a roll-down perspective:

- Steepeners are likely to carry better for pairs involving longer tails and longer expiries

1y curve roll-down (bp)

Expiry	2y-5y	2y-10y	5y-10y	5y-20y	5y-30y	10y-20y	10y-30y
1y	-1.1	-1.2	-0.1	2.5	3.4	2.6	3.5
2y	1.2	2.1	0.9	3.7	4.5	2.8	3.6
3y	0.3	1.5	1.2	3.8	4.5	2.6	3.2
5y	-0.3	1.9	2.2	4.3	4.8	2.1	2.6

Note: Shows the difference between the forward rate curve and the 1y rolled-down rate curve. Positive roll-down: Steepeners likely to carry well. Negative roll-down: Flatteners likely to carry well

1y Beta of slope versus average rate level

Expiry	2y-5y	2y-10y	5y-10y	5y-20y	5y-30y	10y-20y	10y-30y
6m	23.4	35.2	11.8	17.2	16.1	5.3	4.2
1y	15.9	24.6	8.6	12.2	10.5	3.5	1.7
2y	8.2	13.3	5.1	6.3	3.5	1.2	-1.6
3y	4.3	7.5	3.1	2.9	-0.5	-0.2	-3.7
5y	2.0	3.0	1.0	-0.9	-5.4	-1.9	-6.4

Note: Shows the 1y beta of the rate slope (in bp) versus the average of the two rates (in %). Positive beta: Curve tends to bear-steepen/bull-flatten. Negative beta: Curve tends to bull-steepen/bear-flatten

From a slope vs. rate beta perspective:

- Bear-steepeners/bull-flatteners are generally better for shorter expiry pairs
- Pairs involving longer expiries and tenors tend to flatten in a sell-off and steepen in a rally

Note: As of 10 January 2020. Source for all tables: Barclays Research

Some positive carry conditional curve strategies in GBP

GBP bear-flatteners

Expiry	Curve	Spot Spread (bp)	Fwd spread(bp)	Zero cost curve (bp)	Carry in 6m (in bp)	1y Beta of slope verus rate level	Steepest spot curve level over the past yr (bp)
6m	2y-5y	9	11	16	1.2	23	20
6m	2y-10y	23	26	35	1.1	35	39
6m	5y-10y	14	14	17	0.0	12	19
1y	2y-5y	9	11	18	0.2	16	20
1y	2y-10y	23	25	37	0.2	25	39
1y	5y-10y	14	14	18	-0.1	9	19
2y	2y-5y	9	9	16	-0.6	8	20

Note: Strike of longer tenor option has been adjusted to make the structure zero cost

- GBP bear flatteners only offer a small positive carry

- Short expiry bull steepeners carry the best

GBP bear-steepeners

Expiry	Curve	Spot Spread (bp)	Fwd spread(bp)	Zero cost curve (bp)	Carry in 6m (in bp)	1y Beta of slope verus rate level	Flattest spot curve level over the past yr (bp)
6m	5y-30y	26	24	21	1.7	16	1
6m	10y-30y	12	10	10	1.6	4	2
1y	2y-10y	23	25	14	1.4	25	-8
1y	5y-30y	26	22	18	1.4	11	1
1y	10y-30y	12	8	8	0.8	2	2
2y	2y-10y	23	22	12	0.7	13	-8
2y	5y-30y	26	16	15	0.5	4	1
3y	2y-10y	23	19	12	-0.2	8	-8
3y	5y-30y	26	11	12	0.9	-1	1

Note: As of 10 January 2020. Source for all tables: Barclays Research

Note: Strike of longer tenor option has been adjusted to make the structure zero cost

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