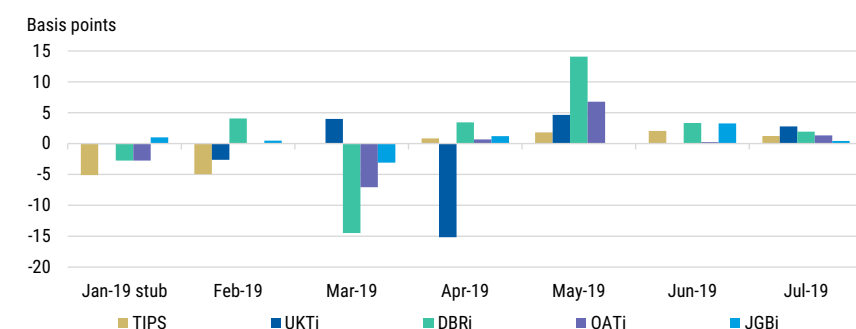


January 2, 2019 10:15 AM GMT

Global Interest Rate Strategy | Global

Global Inflation Tracker

We provide global linker real yield and breakeven carry projections derived from Morgan Stanley inflation forecasts, snapshots of real yield and breakeven forwards, and historical breakeven levels and cross-market spreads.

Exhibit 1: 10y breakeven benchmark monthly carry profile

Source: Morgan Stanley Research, Bloomberg

Inflation Strategy Bulletin

[Global Inflation Strategy: Can Breakevens Climb the Wall of Worry? \(14 Dec 2018\)](#)

[2019 Global Rates Outlook: The Ryder Cup of Bonds \(2 Dec 2018\)](#)

[2019 Global Strategy Outlook: The Turning Point \(25 Nov 2018\)](#)

[US Economics, US Fixed Income Strategy, and Banks: A Surprisingly Early End to Balance Sheet Normalization \(12 Jul 2018\)](#)

[2018 Global Mid-Year Outlook: Favoring The US Over Europe \(18 May 2018\)](#)

[UK Economics and Strategy: Homemade Inflation \(15 Mar 2018\)](#)

[European Economics & Rates Strategy: Inflation: How Will it Surprise? \(12 Dec 2017\)](#)

[US Economics & Rates Strategy: What's Eating Away at Inflation? \(6 Sep 2017\)](#)

[US Economics & Rates Strategy: The Phillips Curve: Wanted Dead or Alive \(12 May 2017\)](#)

MORGAN STANLEY & CO. INTERNATIONAL PLC+

Shreya Chander

STRATEGIST

Shreya.Chander@morganstanley.com

+44 20 7425-4740

MORGAN STANLEY & CO. LLC

Guneet Dhingra, CFA

STRATEGIST

Guneet.Dhingra@morganstanley.com

+1 212 761-1445

Due to the nature of the fixed income market, the issuers or bonds of the issuers recommended or discussed in this report may not be continuously followed. Accordingly, investors must regard this report as providing stand-alone analysis and should not expect continuing analysis or additional reports relating to such issuers or bonds of the issuers.

Morgan Stanley does and seeks to do business with companies covered in Morgan Stanley Research. As a result, investors should be aware that the firm may have a conflict of interest that could affect the objectivity of Morgan Stanley Research. Investors should consider Morgan Stanley Research as only a single factor in making their investment decision.

For analyst certification and other important disclosures, refer to the Disclosure Section, located at the end of this report.

+ = Analysts employed by non-U.S. affiliates are not registered with FINRA, may not be associated persons of the member and may not be subject to NASD/NYSE restrictions on communications with a subject company, public appearances and trading securities held by a research analyst account.

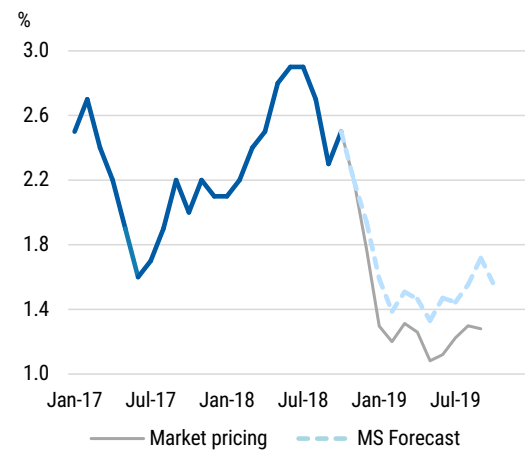
Forecasts

Exhibit 2: Realized and forecast inflation

US CPI			UK RPI		Euro HICPxT		France CPIxT	
	Index	Y/Y %	Index	Y/Y %	Index	Y/Y %	Index	Y/Y %
1/31/2017	242.84	2.5	265.50	2.59	100.39	1.7	100.41	1.4
2/28/2017	243.60	2.7	268.40	3.23	100.77	2.0	100.52	1.2
3/31/2017	243.80	2.4	269.30	3.14	101.59	1.5	101.14	1.1
4/30/2017	244.52	2.2	270.60	3.52	101.96	1.8	101.23	1.1
5/31/2017	244.73	1.9	271.70	3.66	101.84	1.4	101.28	0.8
6/30/2017	244.96	1.6	272.30	3.50	101.86	1.2	101.30	0.7
7/31/2017	244.79	1.7	272.90	3.61	101.33	1.3	100.94	0.7
8/31/2017	245.52	1.9	274.70	3.90	101.60	1.5	101.47	0.9
9/30/2017	246.82	2.2	275.10	3.85	102.04	1.5	101.30	0.9
10/31/2017	246.66	2.0	275.30	3.97	102.14	1.3	101.40	1.0
11/30/2017	246.67	2.2	275.80	3.88	102.20	1.5	101.47	1.1
12/31/2017	246.52	2.1	278.10	4.12	102.58	1.3	101.77	1.1
1/31/2018	247.87	2.1	276.00	3.95	101.64	1.2	101.67	1.3
2/28/2018	248.99	2.2	278.10	3.61	101.84	1.1	101.64	1.1
3/31/2018	249.55	2.4	278.30	3.34	102.83	1.2	102.42	1.3
4/30/2018	250.55	2.5	279.70	3.36	103.12	1.1	102.59	1.3
5/31/2018	251.59	2.8	280.70	3.31	103.64	1.8	103.06	1.8
6/30/2018	251.99	2.9	281.50	3.38	103.76	1.9	103.07	1.7
7/31/2018	252.01	2.9	281.70	3.22	103.41	2.1	102.96	2.0
8/31/2018	252.15	2.7	284.20	3.46	103.58	1.9	103.48	2.0
9/30/2018	252.44	2.3	284.10	3.27	104.05	2.0	103.25	1.9
10/31/2018	252.89	2.5	284.50	3.34	104.30	2.1	103.37	1.9
11/30/2018	252.04	2.2	284.72	3.19	104.13	1.9	103.15	1.7
12/31/2018	251.30	1.9	286.26	2.84	104.53	1.9	103.24	1.4
1/31/2019	251.80	1.6	283.87	2.71	103.49	1.8	102.65	1.0
2/28/2019	252.45	1.4	285.70	2.58	103.88	2.0	102.82	1.2
3/31/2019	253.32	1.5	286.44	2.81	105.02	2.1	103.54	1.1
4/30/2019	254.21	1.5	287.77	2.80	105.31	2.1	103.62	1.0
5/31/2019	254.93	1.3	288.59	2.76	105.52	1.8	103.83	0.7
6/30/2019	255.69	1.5	289.40	2.78	105.57	1.7	103.94	0.8
7/31/2019	255.65	1.4	289.61	2.77	105.07	1.6	103.71	0.7
8/31/2019	256.06	1.6	291.54	2.56	105.31	1.7	104.35	0.8
9/30/2019	256.78	1.7	291.71	2.67	105.71	1.6	103.93	0.7
10/31/2019	256.82	1.6	291.89	2.63	105.86	1.5	103.97	0.6
11/30/2019			292.26	2.71	105.76	1.6	103.97	0.8
12/31/2019			294.02	2.81	106.11	1.5	104.26	1.0

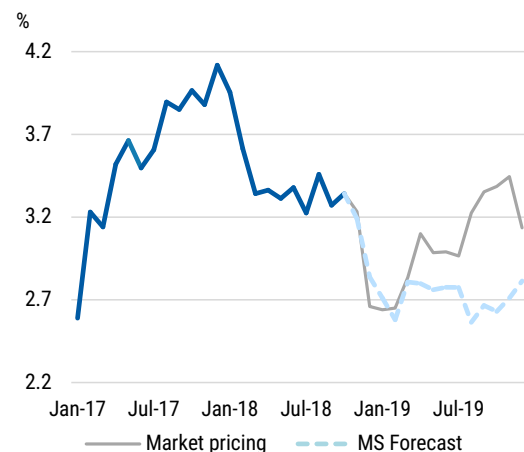
Source: Morgan Stanley Research, Central Banks

Exhibit 3: US CPI: MS forecast & market fixings



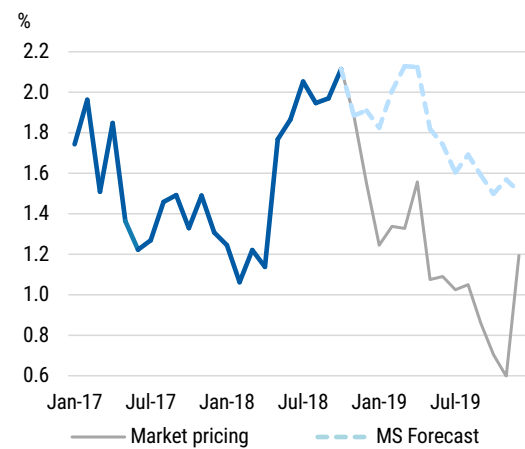
Source: Morgan Stanley Research, BGC

Exhibit 4: UK RPI : MS forecast & market fixings



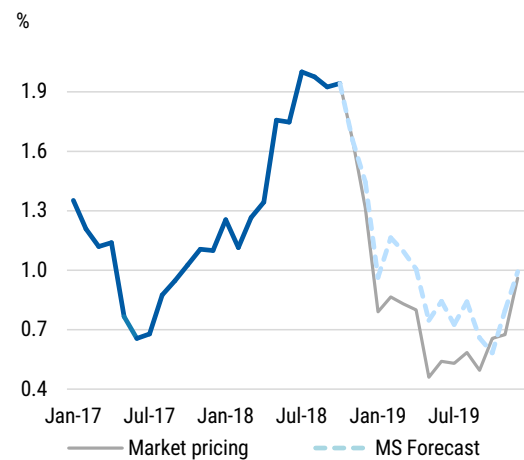
Source: Morgan Stanley Research, BGC

Exhibit 5: Euro HICPxT: MS forecast & market fixings



Source: Morgan Stanley Research, BGC

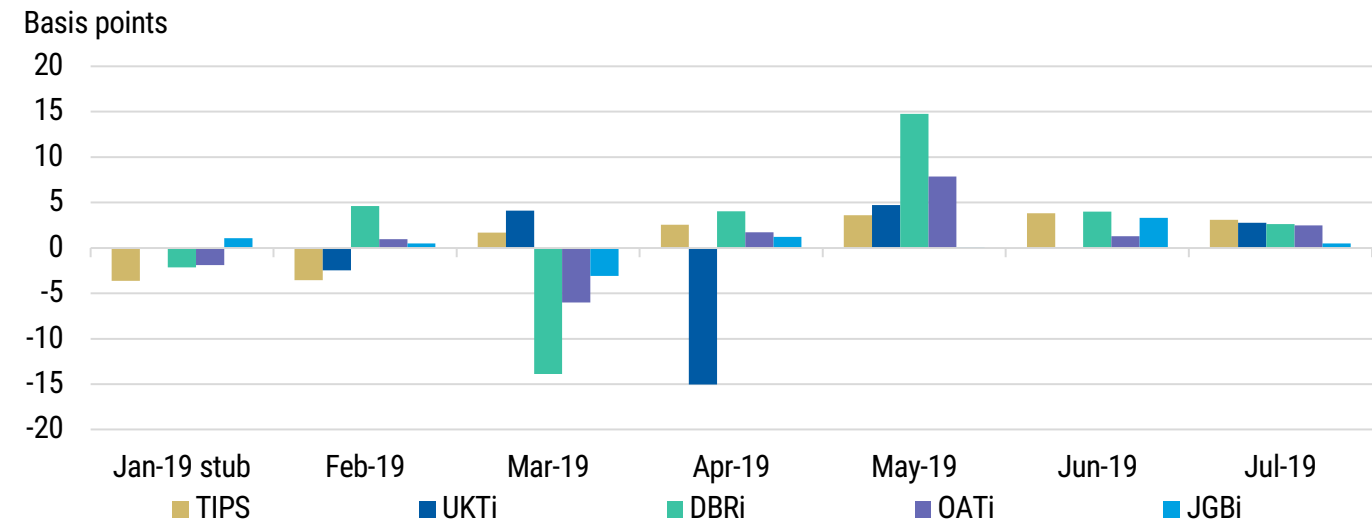
Exhibit 6: France CPIxT: MS forecast & market fixings



Source: Morgan Stanley Research, BGC

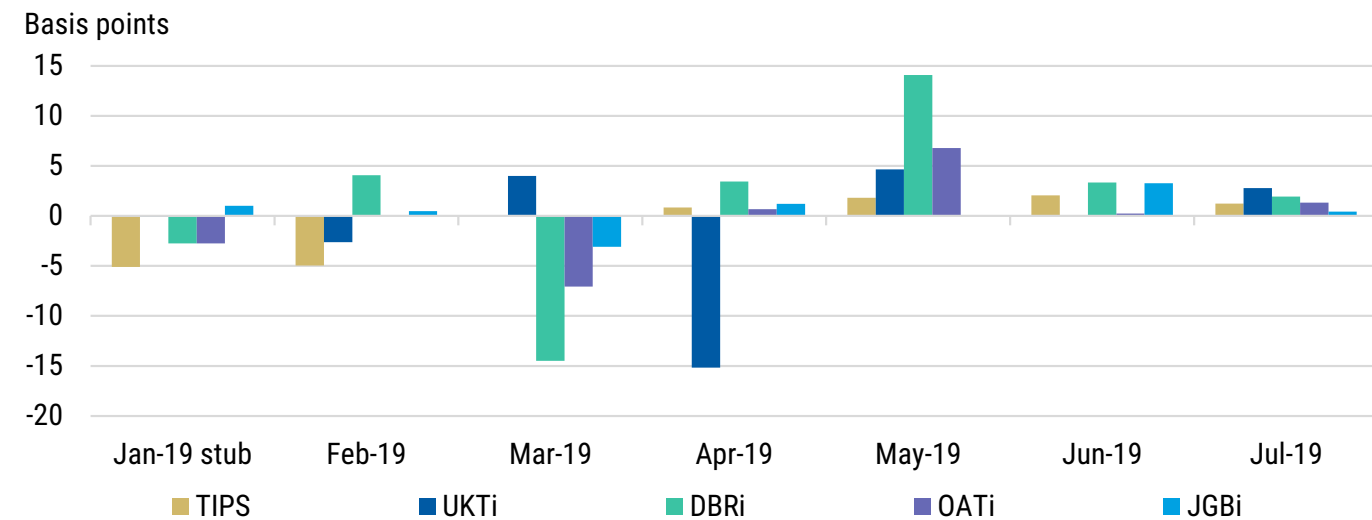
Carry Projections

Exhibit 7: 10y real yield benchmark monthly carry profile



Source: Morgan Stanley Research, Bloomberg

Exhibit 8: 10y breakeven benchmark monthly carry profile



Source: Morgan Stanley Research, Bloomberg

TIPS

Exhibit 9: TIPS real yield and breakeven carry projections

TII	TIPS		TIPS Yield Carry				Reference UST	Breakeven	Breakeven Carry			
	Assumed Spot Price	Funding Rate Spot Yield	1.33% 1M	1.29% 3M	1.28% 6M	2.64% 12M			1.33% 1M	1.29% 3M	1.28% 6M	2.64% 12M
2.125% Jan-19	99.86	6.38%					2.750% Feb-19	-3.99%				
0.125% Apr-19	98.59	5.22%	-4.5	1744.7			1.625% Apr-19	-2.78%	-44.9	1367.8		
1.875% Jul-19	99.71	2.44%	-56.3	-39.4	3464.6		3.625% Aug-19	0.11%	-79.3	-127.1	2930.0	
1.375% Jan-20	99.38	1.99%	-30.9	-28.4	174.3	-17348.4	3.625% Feb-20	0.63%	-43.3	-68.3	63.6	-17307.4
0.125% Apr-20	97.77	1.90%	-25.0	-23.4	113.0	-2021.2	1.375% Apr-20	0.65%	-33.6	-52.6	35.0	-1994.7
1.250% Jul-20	99.81	1.38%	-23.8	-29.0	60.7	-1192.0	2.625% Aug-20	1.15%	-31.4	-52.2	4.0	-1170.3
1.125% Jan-21	99.58	1.34%	-17.9	-21.5	39.6	-626.0	3.625% Feb-21	1.14%	-23.7	-38.5	0.9	-608.5
0.125% Apr-21	97.28	1.34%	-15.8	-18.6	33.8	-495.4	1.375% Apr-21	1.12%	-20.2	-32.8	0.9	-482.1
0.625% Jul-21	98.94	1.05%	-15.3	-19.8	22.6	-438.2	2.125% Aug-21	1.42%	-19.7	-32.7	-6.3	-427.2
0.125% Jan-22	97.10	1.10%	-12.6	-15.8	18.9	-325.6	2.000% Feb-22	1.36%	-16.2	-26.4	-4.3	-316.6
0.125% Apr-22	96.78	1.13%	-11.4	-14.2	17.8	-288.8	1.875% Apr-22	1.34%	-14.6	-24.0	-3.8	-281.3
0.125% Jul-22	97.19	0.94%	-11.2	-14.7	13.1	-268.0	1.625% Aug-22	1.55%	-14.3	-23.7	-6.7	-261.8
0.125% Jan-23	96.63	0.98%	-9.7	-12.4	11.9	-222.7	2.000% Feb-23	1.51%	-12.5	-20.6	-5.6	-217.7
0.625% Apr-23	98.43	1.00%	-9.1	-11.6	11.5	-207.8	2.750% Apr-23	1.49%	-11.6	-19.3	-5.0	-202.7
0.375% Jul-23	97.82	0.87%	-8.8	-11.7	9.1	-195.9	2.500% Aug-23	1.63%	-11.4	-19.1	-6.6	-191.5
0.625% Jan-24	98.48	0.94%	-7.8	-10.1	9.0	-171.5	2.750% Feb-24	1.58%	-10.2	-17.0	-5.5	-168.0
0.125% Jul-24	95.95	0.88%	-7.2	-9.4	7.3	-151.5	2.375% Aug-24	1.67%	-9.4	-15.7	-5.9	-149.1
2.375% Jan-25	108.14	0.98%	-6.6	-8.5	8.4	-145.3	7.625% Feb-25	1.58%	-9.2	-15.5	-5.8	-142.1
0.250% Jan-25	95.79	0.97%	-6.4	-8.2	7.5	-135.4	2.000% Feb-25	1.60%	-8.5	-14.0	-4.7	-133.9
0.375% Jul-25	96.48	0.93%	-6.0	-7.7	6.6	-124.6	2.000% Aug-25	1.66%	-7.9	-13.2	-4.8	-123.5
2.000% Jan-26	106.78	1.00%	-5.7	-7.2	7.2	-120.6	6.000% Feb-26	1.59%	-7.8	-13.1	-4.8	-118.7
0.625% Jan-26	97.46	1.00%	-5.5	-7.0	6.8	-114.5	1.625% Feb-26	1.61%	-7.3	-12.0	-3.9	-114.0
0.125% Jul-26	93.95	0.96%	-5.2	-6.6	5.8	-104.2	1.500% Aug-26	1.67%	-6.8	-11.3	-4.2	-104.0
0.375% Jan-27	95.08	1.01%	-4.8	-6.0	5.9	-97.2	6.625% Feb-27	1.60%	-6.8	-11.5	-5.2	-95.9
2.375% Jan-27	110.46	1.01%	-5.0	-6.3	6.5	-105.7	6.625% Feb-27	1.60%	-7.0	-11.8	-4.5	-104.4
0.375% Jul-27	95.09	0.98%	-4.6	-5.8	5.3	-91.3	2.250% Aug-27	1.69%	-6.2	-10.3	-4.1	-91.6
0.500% Jan-28	95.52	1.02%	-4.3	-5.3	5.3	-85.8	2.750% Feb-28	1.66%	-5.9	-9.8	-3.9	-86.1
1.750% Jan-28	106.30	1.02%	-4.4	-5.6	5.7	-91.0	2.750% Feb-28	1.66%	-6.0	-10.0	-3.5	-91.3
3.625% Apr-28	122.88	1.03%	-4.7	-5.8	5.8	-94.4	5.500% Aug-28	1.66%	-6.5	-10.7	-3.9	-94.6
0.750% Jul-28	97.98	0.97%	-4.1	-5.2	4.8	-82.5	5.500% Aug-28	1.72%	-5.9	-10.1	-5.0	-82.7
2.500% Jan-29	97.98	0.97%	-4.1	-5.2	4.8	-82.5	5.250% Feb-29	1.72%	-5.9	-10.1	-5.0	-82.7
3.875% Apr-29	113.98	1.03%	-4.1	-5.1	5.4	-84.2	5.250% Feb-29	1.68%	-5.8	-9.8	-4.0	-84.6
3.375% Apr-32	127.45	1.05%	-4.3	-5.3	5.4	-85.8	5.375% Feb-31	1.65%	-6.0	-9.9	-3.9	-86.2
2.125% Feb-40	128.56	1.06%	-3.4	-4.1	4.3	-65.8	4.625% Feb-40	1.66%	-4.9	-8.2	-3.9	-66.4
2.125% Feb-41	117.66	1.18%	-2.1	-2.4	3.1	-39.9	4.750% Feb-41	1.73%	-3.1	-5.3	-2.7	-41.7
0.750% Feb-42	118.32	1.18%	-2.0	-2.3	3.0	-38.3	3.125% Feb-42	1.76%	-3.0	-5.2	-2.8	-40.2
0.625% Feb-43	90.93	1.20%	-1.7	-2.0	2.6	-32.5	3.125% Feb-43	1.78%	-2.6	-4.6	-2.7	-34.5
1.375% Feb-44	87.88	1.21%	-1.6	-1.9	2.4	-30.8	3.625% Feb-44	1.80%	-2.5	-4.4	-2.7	-32.9
0.750% Feb-45	103.58	1.21%	-1.7	-1.9	2.6	-32.1	2.500% Feb-45	1.80%	-2.6	-4.5	-2.6	-34.2
1.000% Feb-46	89.64	1.21%	-1.5	-1.8	2.3	-28.9	2.500% Feb-46	1.80%	-2.4	-4.1	-2.4	-30.9
0.875% Feb-47	95.02	1.22%	-1.5	-1.7	2.3	-28.8	2.500% Feb-46	1.81%	-2.3	-4.0	-2.3	-30.8
1.000% Feb-48	91.97	1.21%	-1.4	-1.7	2.2	-27.4	3.000% Feb-48	1.81%	-2.3	-4.0	-2.4	-29.4

Source: Morgan Stanley Research, Bloomberg

UKTi

Exhibit 10: UKTi real yield and breakeven carry projections

UKTi			UKTi Yield Carry				Breakeven Carry					
UKTi	Assumed Funding Rate		0.95%	0.95%	1.00%	1.07%	Reference UKT	Breakeven	0.95%	0.95%	1.00%	1.07%
	Spot Price	Spot Yield	1M	3M	6M	12M			1M	3M	6M	12M
0.125% Nov-19	102.05	-2.14%	-22.7	-151.5	-109.7		1.75% Jul-19	2.89%	-21.1	-137.0	105.0	
1.875% Nov-22	117.01	-2.28%	-5.3	-28.7	-15.4	-27.6	0.50% Jul-22	3.08%	-5.0	-27.5	-12.0	-16.9
0.125% Mar-24	112.82	-2.18%	-3.6	-20.1	-9.5	-16.1	2.75% Sep-24	3.12%	-3.5	-19.8	-8.6	-12.9
0.125% Mar-26	117.05	-2.05%	-2.5	-13.9	-5.8	-8.9	1.50% Jul-26	3.12%	-2.7	-14.4	-6.3	-8.9
1.250% Nov-27	132.40	-2.05%	-2.1	-11.6	-4.9	-7.3	4.25% Dec-27	3.20%	-2.3	-12.2	-5.8	-8.4
0.125% Aug-28	122.87	-2.02%	-1.7	-10.0	-3.7	-5.9	1.63% Oct-28	3.30%	-2.0	-10.9	-5.3	-8.5
0.125% Mar-29	123.57	-1.95%	-1.7	-9.5	-3.4	-4.9	4.75% Dec-30	3.33%	-2.0	-10.6	-5.5	-8.4
1.250% Nov-32	150.64	-1.91%	-1.3	-7.2	-2.6	-3.4	4.25% Jun-32	3.41%	-1.7	-8.5	-4.9	-7.6
0.750% Mar-34	145.91	-1.85%	-1.1	-6.4	-2.0	-2.6	4.50% Sep-34	3.45%	-1.5	-7.6	-4.4	-7.1
2.000% Jan-35	276.79	-5.02%	6.2	-2.4	-3.5	-15.6	4.50% Sep-34	6.63%	5.8	-3.6	-5.9	-20.2
0.125% Nov-36	141.21	-1.81%	-0.9	-5.1	-1.5	-1.9	4.25% Mar-36	3.48%	-1.3	-6.4	-4.0	-6.5
1.125% Nov-37	166.03	-1.80%	-0.9	-5.2	-1.5	-1.8	1.75% Sep-37	3.53%	-1.3	-6.4	-3.8	-6.1
0.625% Mar-40	159.93	-1.71%	-0.7	-4.4	-1.1	-1.1	4.25% Dec-40	3.47%	-1.2	-5.7	-3.5	-5.6
0.125% Aug-41	150.25	-1.69%	-0.6	-3.9	-0.8	-0.9	4.25% Dec-40	3.45%	-1.1	-5.2	-3.3	-5.4
0.625% Nov-42	168.18	-1.68%	-0.6	-3.9	-0.9	-0.8	4.50% Dec-42	3.46%	-1.1	-5.1	-3.3	-5.3
0.125% Mar-44	154.48	-1.62%	-0.6	-3.5	-0.7	-0.5	3.25% Jan-44	3.44%	-1.0	-4.7	-3.0	-4.8
0.125% Mar-46	158.24	-1.58%	-0.5	-3.2	-0.6	-0.3	1.50% Jul-47	3.38%	-0.8	-4.1	-2.3	-3.6
0.750% Nov-47	185.81	-1.58%	-0.5	-3.2	-0.6	-0.3	1.50% Jul-47	3.39%	-0.8	-4.1	-2.4	-3.6
0.125% Aug-48	164.19	-1.57%	-0.5	-2.9	-0.5	-0.3	1.50% Jul-47	3.37%	-0.8	-3.8	-2.2	-3.6
0.500% Mar-50	183.68	-1.57%	-0.5	-2.9	-0.5	-0.2	4.25% Dec-49	3.35%	-0.8	-3.9	-2.4	-3.9
0.250% Mar-52	178.94	-1.56%	-0.4	-2.6	-0.4	-0.2	3.75% Jul-52	3.30%	-0.8	-3.6	-2.2	-3.3
1.250% Nov-55	238.35	-1.53%	-0.4	-2.6	-0.4	-0.1	4.25% Dec-55	3.25%	-0.7	-3.4	-2.0	-3.0
0.125% Nov-56	184.80	-1.52%	-0.4	-2.2	-0.3	-0.1	4.25% Dec-55	3.24%	-0.6	-3.1	-1.9	-3.0
0.125% Mar-58	187.88	-1.51%	-0.3	-2.2	-0.3	0.0	4.00% Jan-60	3.20%	-0.6	-2.9	-1.7	-2.6
0.375% Mar-62	215.43	-1.51%	-0.3	-2.0	-0.3	0.0	4.00% Jan-60	3.20%	-0.6	-2.8	-1.7	-2.6
0.125% Nov-65	212.21	-1.51%	-0.3	-1.8	-0.3	0.0	2.50% Jul-65	3.20%	-0.5	-2.4	-1.4	-2.1
0.125% Mar-68	223.97	-1.55%	-0.3	-1.7	-0.3	-0.1	3.50% Jul-68	3.25%	-0.5	-2.4	-1.5	-2.3

Source: Morgan Stanley Research, Bloomberg

Euro-indexed linkers

DBRi

Exhibit 11: DBRi real yield and breakeven carry projections

DBRi			DBRi Yield Carry				Breakeven Carry					
OBLi/DBRi	Assumed Funding Rate		-0.57%	-0.57%	-0.57%	-0.56%	Reference DBR	Breakeven	-0.57%	-0.57%	-0.57%	-0.56%
	Spot Price	Spot Yield	1M	3M	6M	12M			1M	3M	6M	12M
1.75% Apr-20	102.88	-0.49%	-8.4	-68.5	136.0	589.8	3.25% Jan-20	-0.33%	-6.9	-61.0	160.1	
0.10% Apr-23	105.44	-1.14%	-3.3	-20.8	19.2	28.0	1.50% May-23	0.75%	-3.7	-21.9	16.8	22.5
0.10% Apr-26	108.46	-1.02%	-1.7	-11.5	11.7	16.7	0.50% Feb-25	0.85%	-2.4	-13.3	8.0	8.6
0.50% Apr-30	115.67	-0.82%	-0.9	-7.0	8.5	12.5	6.25% Jan-30	1.08%	-1.4	-9.0	4.0	2.3
0.10% Apr-46	122.96	-0.67%	-0.3	-2.6	3.7	5.4	2.50% Aug-46	1.51%	-0.6	-4.0	0.6	-1.2

Source: Morgan Stanley Research, Bloomberg

OATei

Exhibit 12: OATei real yield and breakeven carry projections

OATei			OATei Yield Carry				Breakeven Carry					
Assumed Funding Rate			-0.50%	-0.50%	-0.50%	-0.49%						
OATei	Spot Price	Spot Yield	1M	3M	6M	12M	Reference OAT	Breakeven	1M	3M	6M	12M
2.25% Jul-20	105.48	-1.24%	-10.3	-67.6	62.3	142.9	3.50% Apr-20	0.65%	-10.0	-65.9	66.9	167.1
0.10% Mar-21	102.74	-1.15%	-7.7	-45.5	40.6	71.5	3.75% Apr-21	0.66%	-8.0	-45.9	39.9	70.0
1.10% Jul-22	108.33	-1.19%	-4.1	-26.3	22.5	32.5	3.00% Apr-22	0.83%	-4.7	-27.7	19.6	25.4
0.25% Jul-24	106.91	-0.96%	-2.4	-15.3	15.5	22.8	2.25% May-24	0.98%	-3.1	-17.8	10.2	10.4
1.85% Jul-27	121.82	-0.63%	-1.1	-9.2	12.8	19.7	2.75% Oct-27	1.15%	-1.9	-12.2	6.3	5.4
0.70% Jul-30	112.17	-0.33%	-0.7	-6.1	10.2	16.4	2.50% May-30	1.17%	-1.5	-9.1	3.7	2.0
3.15% Jul-32	147.84	-0.30%	-0.6	-5.7	10.1	16.1	5.75% Oct-32	1.27%	-0.9	-8.3	3.8	1.9
0.10% Jul-36	103.63	-0.10%	-0.4	-3.6	7.1	11.5	1.25% May-36	1.35%	-1.4	-6.4	1.3	-0.5
1.80% Jul-40	141.24	-0.09%	-0.4	-3.3	6.7	10.8	4.50% Apr-41	1.46%	-0.6	-5.6	1.4	-0.9

Source: Morgan Stanley Research, Bloomberg

BTPei

Exhibit 13: BTPei breakeven and real yield carry projections

BTPei			BTPei Yield Carry				Breakeven Carry					
Assumed Funding Rate			-0.41%	-0.41%	-0.38%	-0.38%						
BTPei	Spot Price	Spot Yield	1M	3M	6M	12M	Reference BTP	Breakeven	1M	3M	6M	12M
2.35% Sep-19	101.66	-0.04%	-13.3	-145.5	596.8		4.25% Sep-19	0.32%	-21.6	-181.5	400.1	
2.10% Sep-21	104.20	0.53%	-1.3	-21.1	68.1	147.9	4.75% Sep-21	0.48%	-5.8	-35.5	35.3	58.1
0.10% May-22	97.42	0.88%	0.1	-13.0	57.4	117.9	1.35% Apr-22	0.35%	-4.4	-26.7	27.8	44.6
2.60% Sep-23	106.78	1.11%	0.4	-8.6	44.2	87.0	4.75% Aug-23	0.54%	-4.6	-22.2	16.0	22.7
2.35% Sep-24	105.59	1.33%	0.7	-6.0	38.2	73.8	3.75% Sep-24	0.71%	-3.3	-18.1	12.6	15.7
3.10% Sep-26	110.80	1.60%	0.8	-3.6	31.0	58.9	4.50% Mar-26	0.73%	-2.8	-14.7	7.8	7.5
1.30% May-28	95.69	1.80%	0.9	-2.1	25.3	47.4	4.75% Sep-28	0.80%	-2.2	-11.6	5.6	4.7
1.25% Sep-32	91.15	1.99%	0.8	-1.1	18.3	33.8	1.65% Mar-32	0.89%	-1.6	-8.2	3.8	3.2
2.35% Sep-35	105.93	1.93%	0.6	-1.1	16.1	29.6	2.35% Sep-35	0.00%	-0.8	-5.3	7.6	11.7
2.55% Sep-41	106.45	2.19%	0.6	-0.5	13.5	24.9	5.00% Sep-40	1.30%	-1.7	-7.4	-0.5	-4.5

Source: Morgan Stanley Research, Bloomberg

SPGBei

Exhibit 14: SPGBei breakeven and real yield carry projections

SPGBei			SPGBei Yield Carry				Breakeven Carry					
Assumed Funding Rate			-0.40%	-0.40%	-0.40%	-0.35%						
SPGBei	Spot Price	Spot Yield	1M	3M	6M	12M	Reference SPGB	Breakeven	1M	3M	6M	12M
0.55% Nov-19	101.30	-0.88%	-17.6	-125.8	187.8		4.30% Oct-19	0.45%	-17.8	-125.3	191.1	
0.30% Nov-21	103.62	-0.93%	-5.1	-31.4	30.9	48.0	0.75% Jul-21	0.76%	-5.9	-34.0	25.3	36.1
0.15% Nov-23	103.17	-0.49%	-2.3	-15.8	21.8	34.8	4.40% Oct-23	0.89%	-3.5	-20.1	12.2	13.4
1.80% Nov-24	112.99	-0.37%	-1.7	-12.9	19.8	31.7	3.80% Apr-24	0.93%	-2.7	-17.4	9.7	9.1
0.65% Nov-27	104.56	0.13%	-0.8	-7.0	15.5	25.8	1.50% Apr-27	1.08%	-2.4	-12.2	4.6	2.9
1.00% Nov-30	106.31	0.46%	-0.4	-4.7	13.2	22.4	1.95% Jul-30	1.20%	-1.9	-9.6	3.0	1.1

Source: Morgan Stanley Research, Bloomberg

OATi

Exhibit 15: OATi real yield and breakeven carry projections

OATi			OATi Yield Carry				Breakeven Carry						
	Assumed Funding Rate		-0.57%	-0.50%	-0.50%	-0.49%			-0.57%	-0.50%	-0.50%	-0.49%	
OATi	Spot Price	Spot Yield	1M	3M	6M	12M	Reference OAT	Breakeven	1M	3M	6M	12M	
1.30% Jul-19	101.02	-0.54%	-38.0	-217.1	461.3		4.25% Apr-19	-0.29%	-28.4	-77.1			
0.10% Jul-21	102.72	-0.95%	-8.4	-32.9	3.1	9.3	3.75% Apr-21	0.46%	-9.0	-33.3	2.4	7.8	
2.10% Jul-23	113.54	-0.81%	-4.1	-17.1	3.9	9.2	4.25% Oct-23	0.70%	-5.1	-19.5	-1.1	-2.2	
0.10% Mar-25	104.21	-0.57%	-3.0	-11.4	4.4	10.2	0.50% May-25	0.78%	-4.0	-14.3	-1.6	-3.2	
0.10% Mar-28	104.19	-0.35%	-1.8	-7.0	4.2	9.2	2.75% Oct-27	0.87%	-2.7	-10.0	-2.3	-5.0	
3.40% Jul-29	141.28	-0.42%	-1.5	-6.8	4.0	8.6	5.50% Apr-29	1.10%	-2.1	-9.7	-2.6	-6.5	

Source: Morgan Stanley Research, Bloomberg

JGBi

Exhibit 16: JGBi real yield and breakeven carry projections

JGBi			JGBi Yield Carry				Breakeven Carry						
	Assumed Funding Rate		-0.15%	-0.15%	-0.16%	-0.16%			-0.15%	-0.15%	-0.16%	-0.16%	
JGBi	Spot Price	Spot Yield	1M	3M	6M	12M	Reference JGB	Breakeven	1M	3M	6M	12M	
0.10% Sep-23	102.15	-0.36%	1.7	-3	5.5	38.6	0.80% Sep-23	0.20%	1.8	-2.9	5.6	38.5	
0.10% Mar-24	102.40	-0.36%	1.5	-3.2	4.3	33.3	0.60% Mar-24	0.20%	1.6	-3.1	4.3	33.2	
0.10% Sep-24	102.60	-0.35%	1.4	-3	3.5	29.4	0.50% Sep-24	0.20%	1.5	-3.2	3.5	29.3	
0.10% Mar-25	102.85	-0.36%	1.3	-3.1	3.1	26.4	0.40% Mar-25	0.20%	1.4	-3.0	3.1	26.3	
0.10% Mar-26	103.35	-0.36%	1.1	-3	2.7	22.1	0.10% Mar-26	0.21%	1.1	-2.6	2.6	21.9	
0.10% Mar-27	103.50	-0.32%	1.3	-1.6	3.2	20.2	0.10% Mar-27	0.22%	1.2	-1.7	2.8	19.4	
0.10% Mar-28	103.20	-0.24%	1.2	-1	3.3	18.7	0.10% Mar-28	0.20%	1.1	-1.5	2.6	17.3	

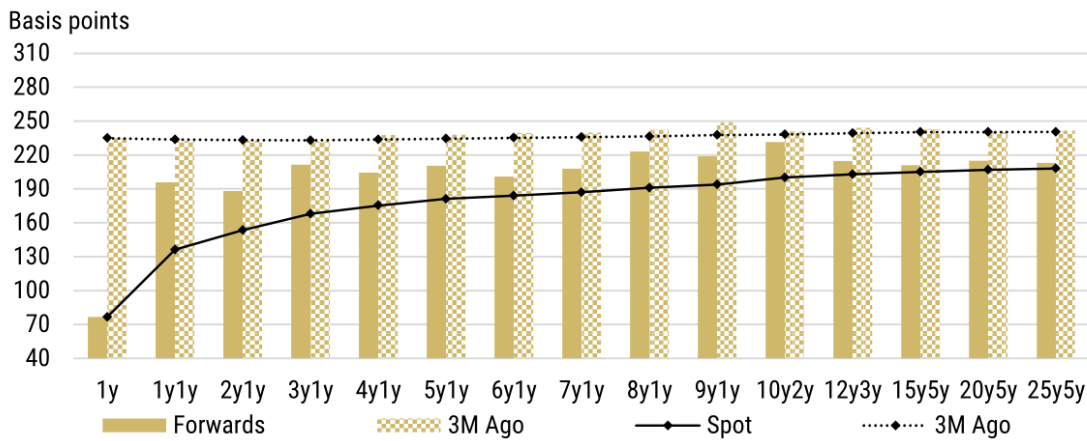
Source: Morgan Stanley Research, Bloomberg

Forward real yield and breakeven curves

We construct forward breakeven and real yield curves by estimating the forward rates between inflation bonds and inflation swaps. These curves reflect the market's pricing of the evolution of the spot real yield and inflation rates. We use the same maturity month bonds to calculate forward real yield and breakeven curves so as to avoid distortions stemming from seasonality issues.

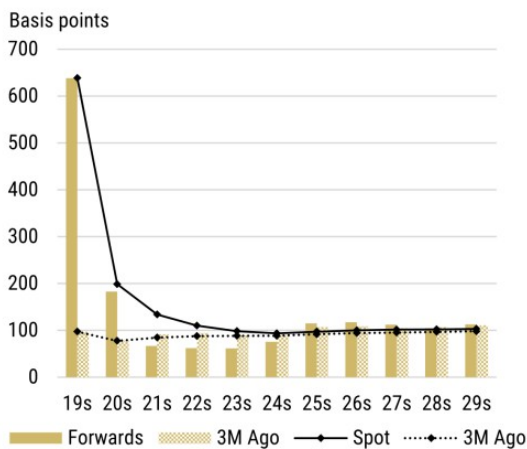
United States

Exhibit 17: US CPI breakeven forwards



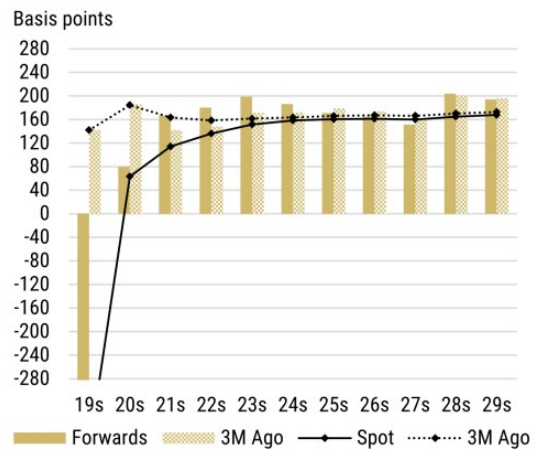
Source: Morgan Stanley Research, Bloomberg

Exhibit 18: TII January maturity real yield forwards

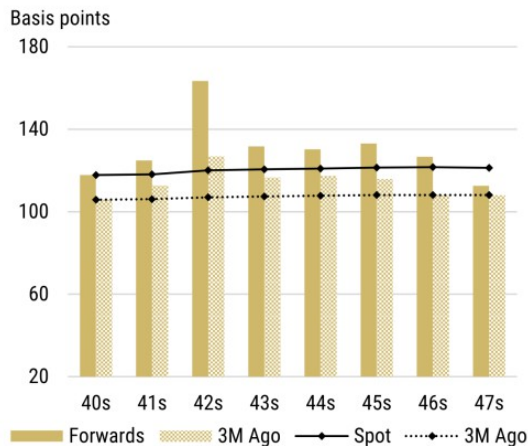


Source: Morgan Stanley Research, Bloomberg

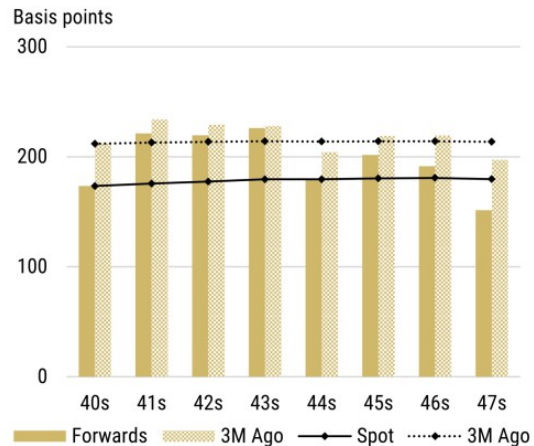
Exhibit 19: TII January maturity breakeven forwards



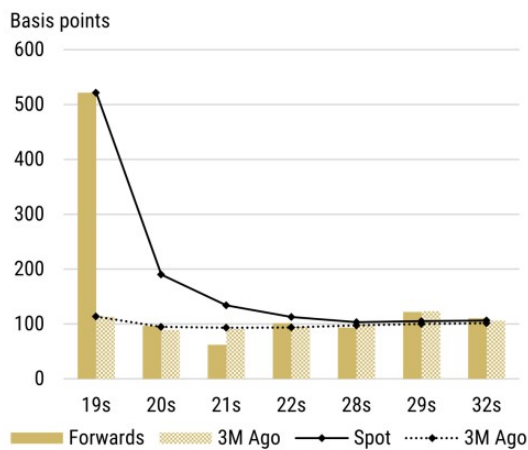
Source: Morgan Stanley Research, Bloomberg

Exhibit 20: TII February maturity real yield forwards


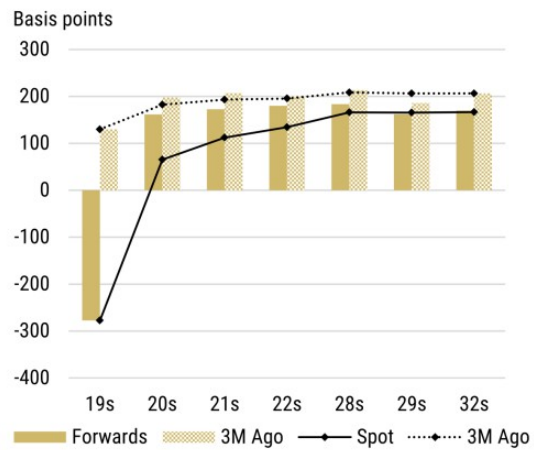
Source: Morgan Stanley Research, Bloomberg

Exhibit 21: TII February maturity breakeven forwards


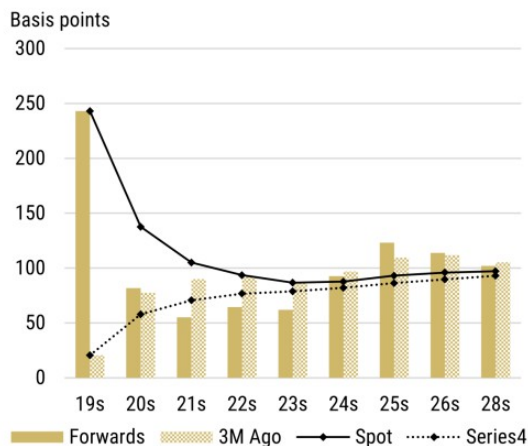
Source: Morgan Stanley Research, Bloomberg

Exhibit 22: TII April maturity real yield forwards


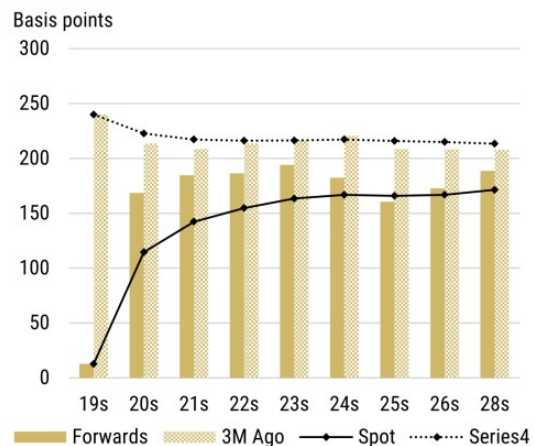
Source: Morgan Stanley Research, Bloomberg

Exhibit 23: TII April maturity breakeven forwards


Source: Morgan Stanley Research, Bloomberg

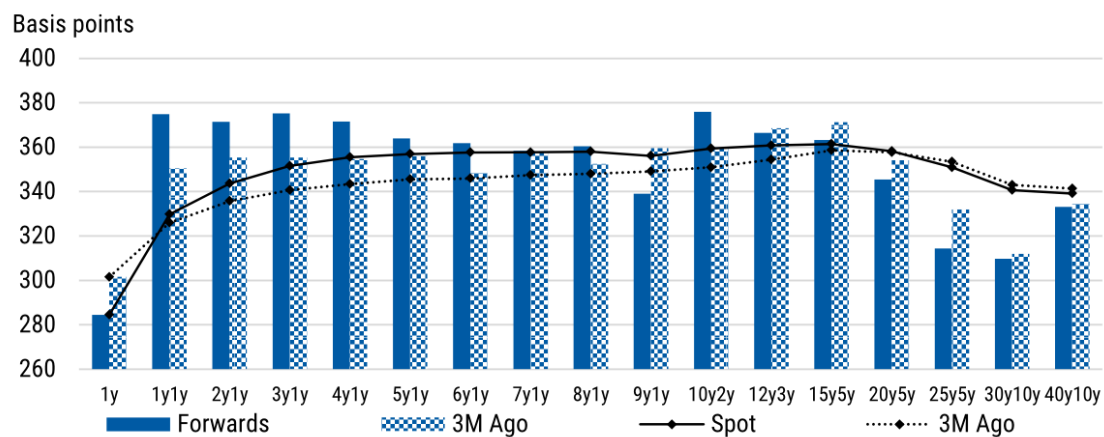
Exhibit 24: TII July maturity real yield forwards


Source: Morgan Stanley Research, Bloomberg

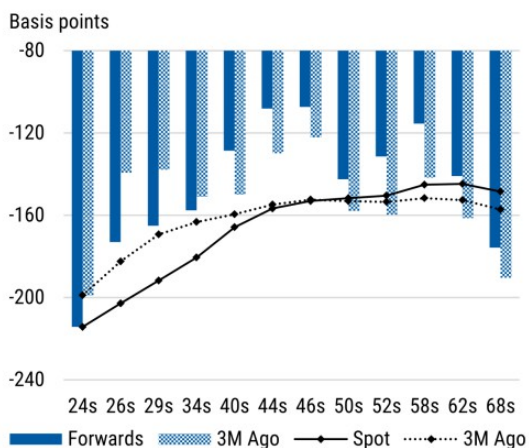
Exhibit 25: TII July maturity breakeven forwards


Source: Morgan Stanley Research, Bloomberg

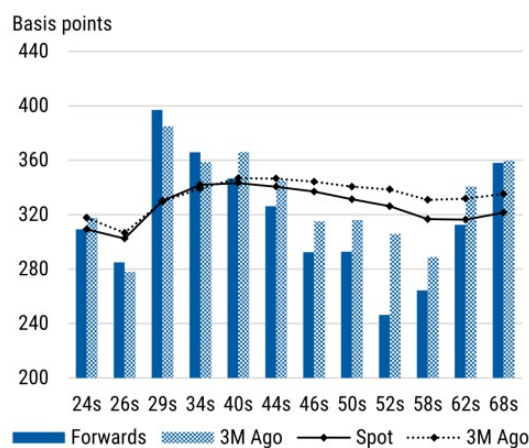
United Kingdom

Exhibit 26: UK RPI breakeven forwards

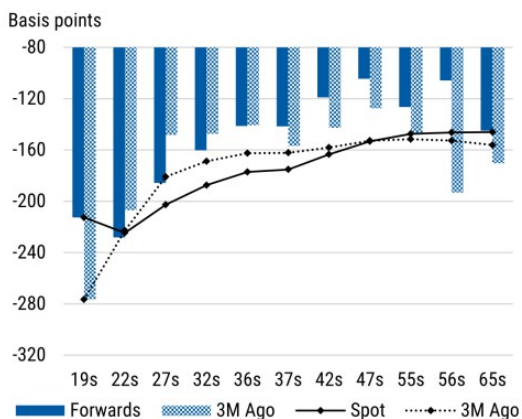
Source: Morgan Stanley Research, Bloomberg

Exhibit 27: UKTi March maturity real yield forwards

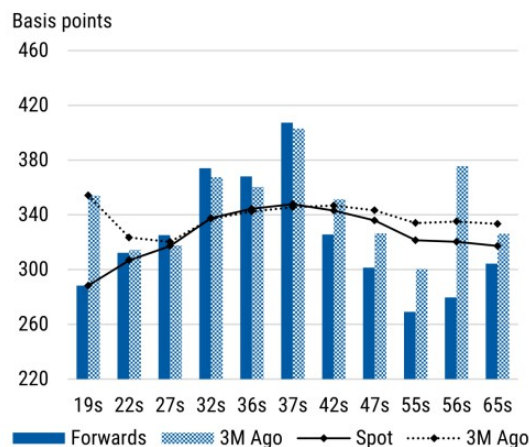
Source: Morgan Stanley Research, Bloomberg

Exhibit 28: UKTi March maturity breakeven forwards

Source: Morgan Stanley Research, Bloomberg

Exhibit 29: UKTi November maturity real yield forwards

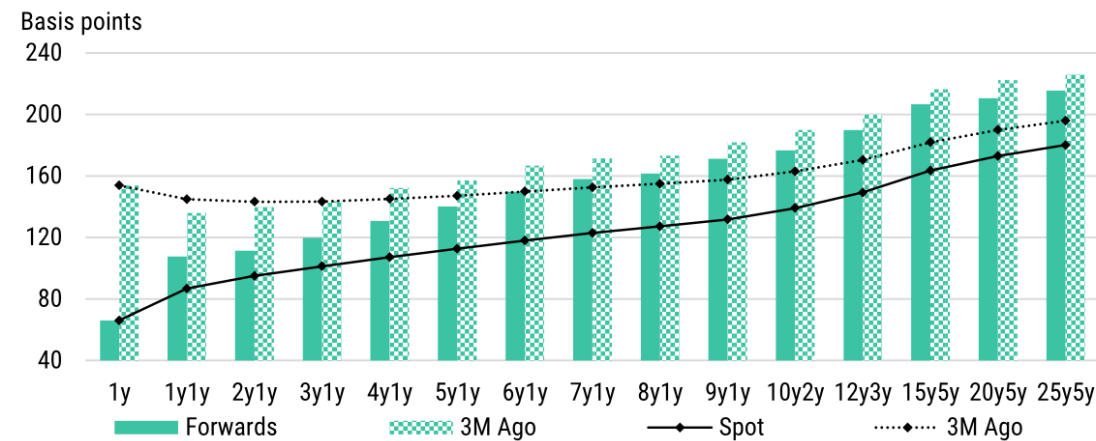
Source: Morgan Stanley Research, Bloomberg

Exhibit 30: UKTi November maturity breakeven forwards

Source: Morgan Stanley Research, Bloomberg

Euro Area

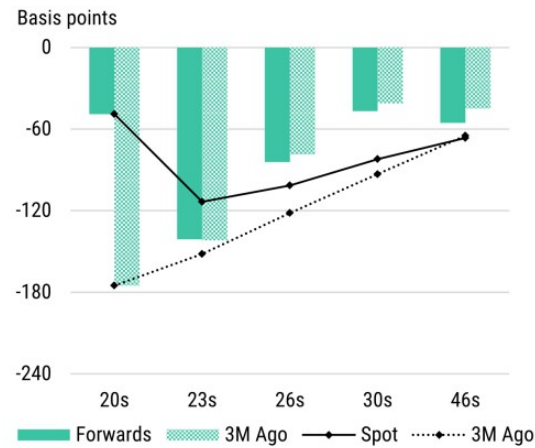
Exhibit 31: Euro HICPxT breakeven forwards



Source: Morgan Stanley Research, Bloomberg

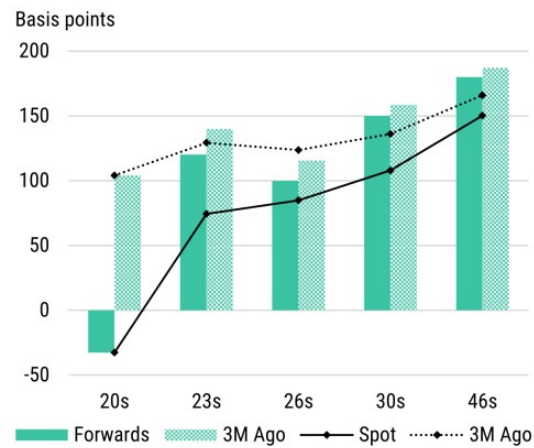
DBRi

Exhibit 32: DBRi April maturity real yield forwards



Source: Morgan Stanley Research, Bloomberg

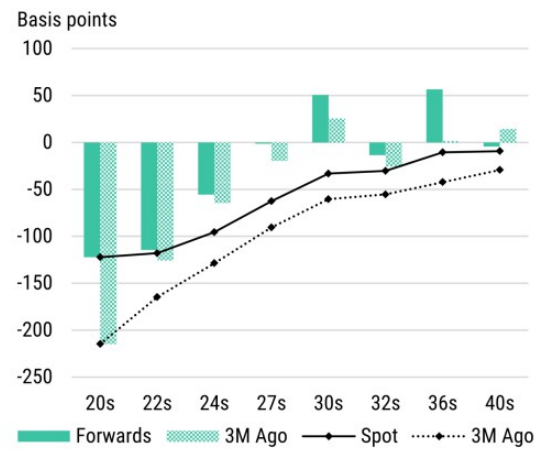
Exhibit 33: DBRi April maturity breakeven forwards



Source: Morgan Stanley Research, Bloomberg

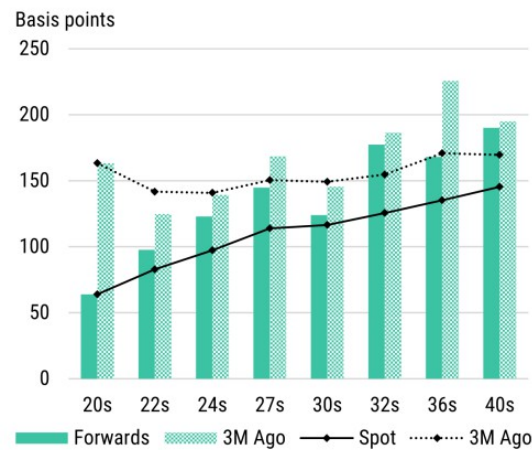
OATei

Exhibit 34: OATei July maturity real yield forwards



Source: Morgan Stanley Research, Bloomberg

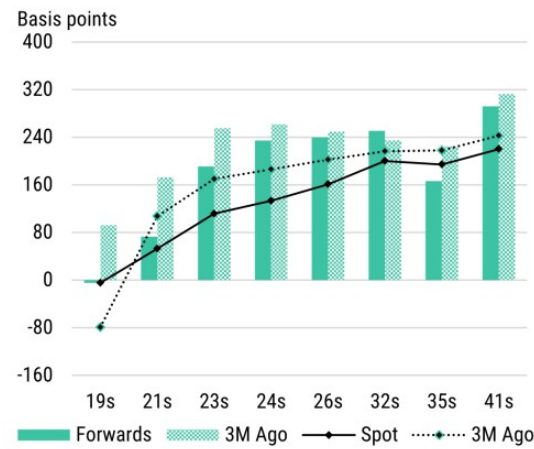
Exhibit 35: OATei July maturity breakeven forwards



Source: Morgan Stanley Research, Bloomberg

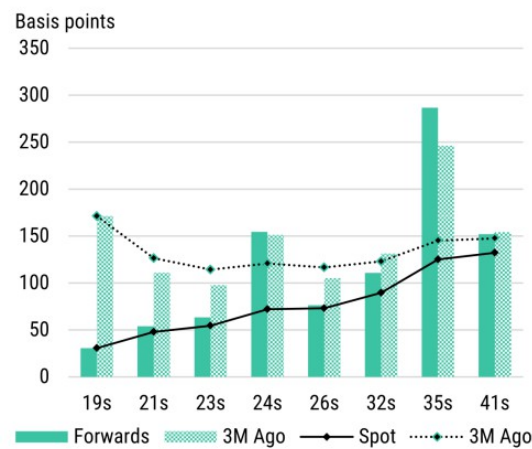
BTPei

Exhibit 36: BTPei September maturity real yield forwards



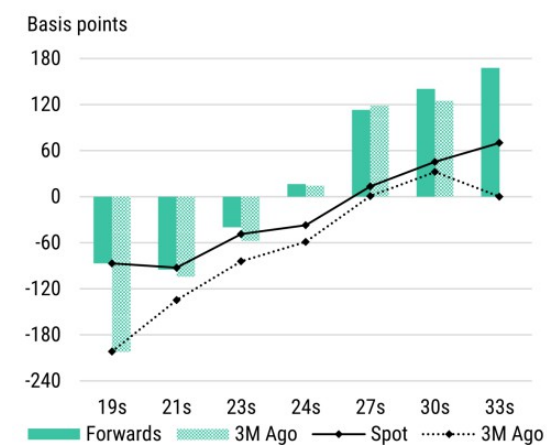
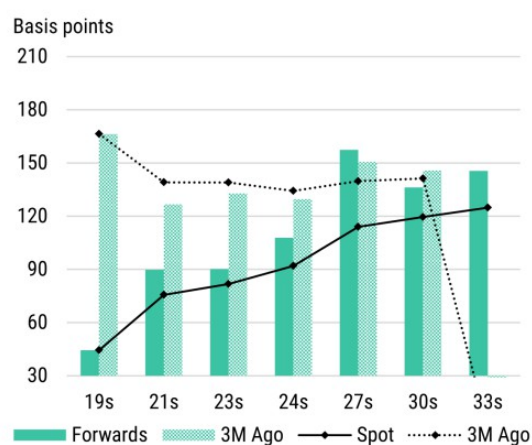
Source: Morgan Stanley Research, Bloomberg

Exhibit 37: BTPei September maturity breakeven forwards



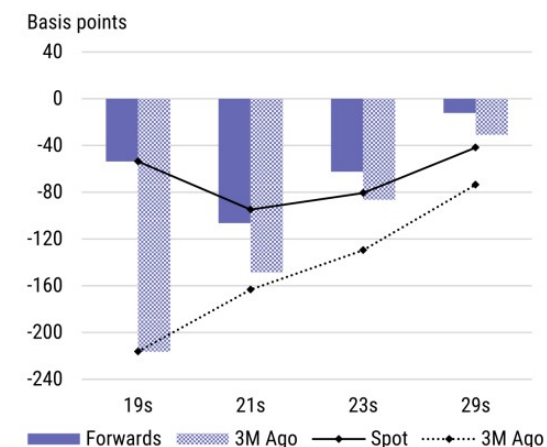
Source: Morgan Stanley Research, Bloomberg

SPGBei

Exhibit 38: SPGBei November maturity real yield forwards

Exhibit 39: SPGBei November maturity breakeven forwards


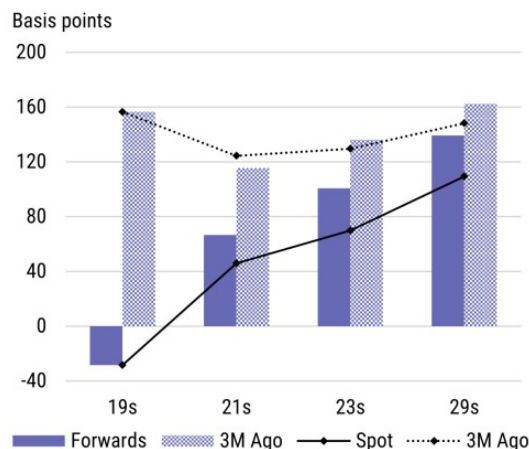
France

Exhibit 40: OATi July maturity real yield forwards



Source: Morgan Stanley Research, Bloomberg

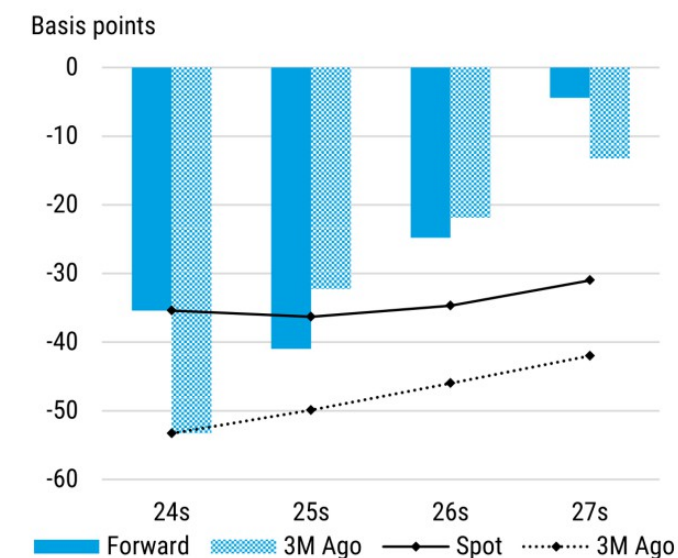
Exhibit 41: OATi July maturity breakeven forwards



Source: Morgan Stanley Research, Bloomberg

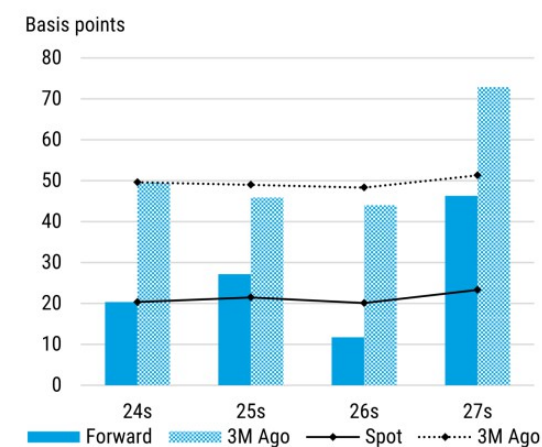
Japan

Exhibit 42: JGBi March maturity real yield forwards



Source: Morgan Stanley Research, Bloomberg

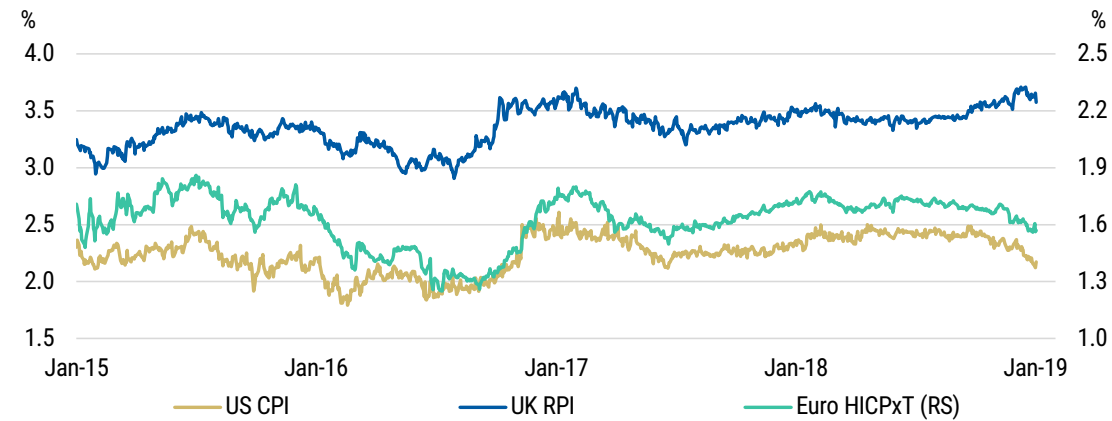
Exhibit 43: JGBi March maturity breakeven forwards



Source: Morgan Stanley Research, Bloomberg

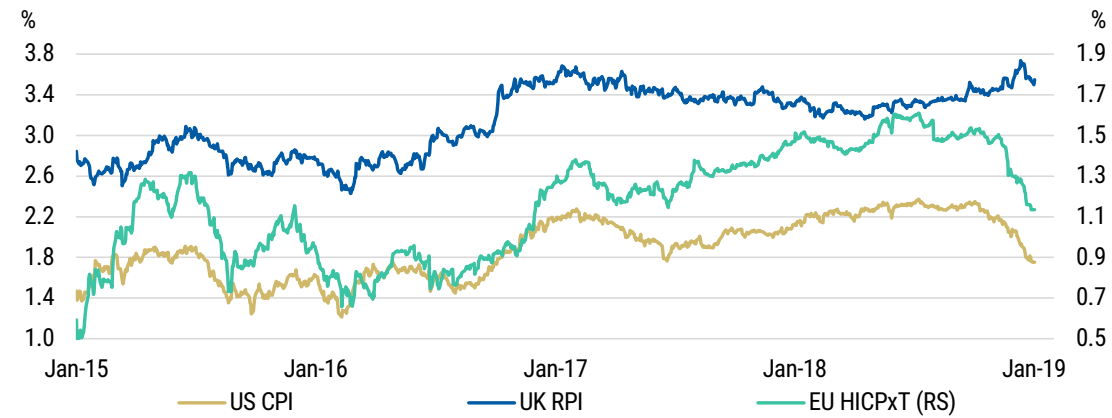
Historical breakeven levels and cross-market spreads

Exhibit 44: US, UK and Euro 5y5y swap breakevens



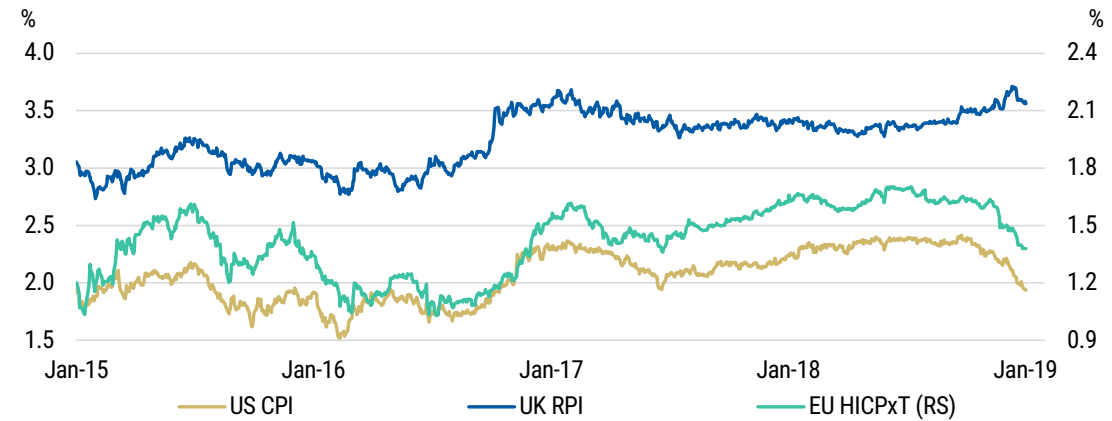
Source: Morgan Stanley Research, Bloomberg

Exhibit 45: US, UK and Euro 5y swap breakevens



Source: Morgan Stanley Research, Bloomberg

Exhibit 46: US, UK and Euro 10y swap breakevens



Source: Morgan Stanley Research, Bloomberg

United States

Exhibit 47: 5y5y CPI & 5y5y TII breakeven

Source: Morgan Stanley Research, Bloomberg

Exhibit 48: 5y CPI & 5y TII breakeven

Source: Morgan Stanley Research, Bloomberg

Exhibit 49: 10y CPI & 10y TII breakeven

Source: Morgan Stanley Research, Bloomberg

Exhibit 50: 5y5y & 5y TII breakevens

Source: Morgan Stanley Research, Bloomberg

Exhibit 51: 5y5y & 5y CPI breakevens

Source: Morgan Stanley Research, Bloomberg

Exhibit 52: 10y20y & 10y TII breakevens



Source: Morgan Stanley Research, Bloomberg

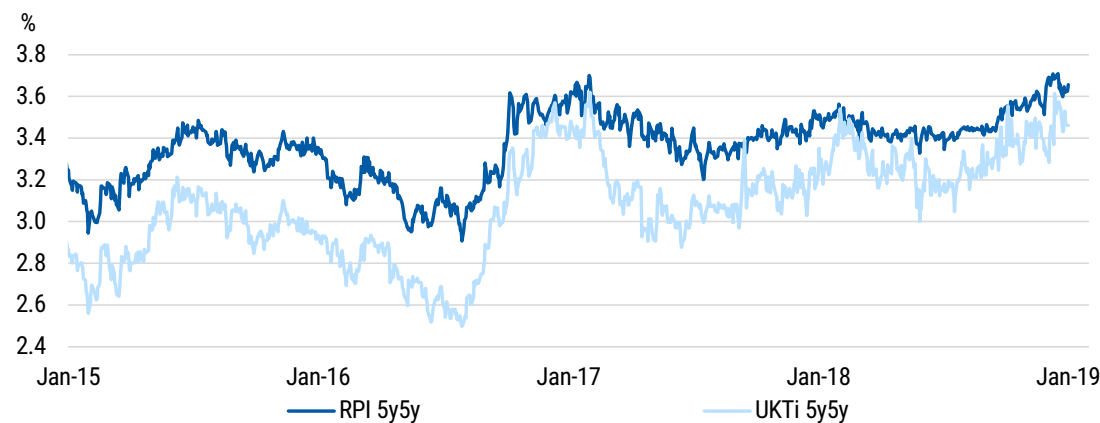
Exhibit 53: 10y20y & 10y CPI breakevens



Source: Morgan Stanley Research, Bloomberg

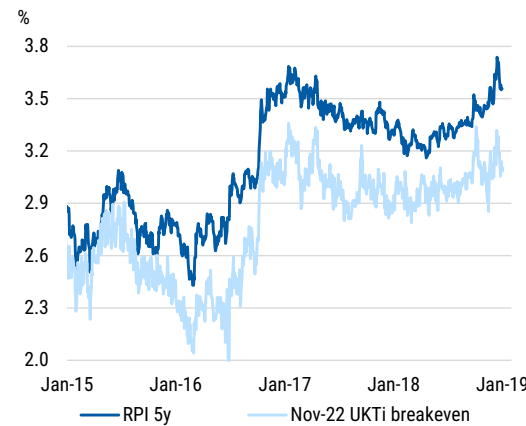
United Kingdom

Exhibit 54: 5y5y RPI & 5y5y UKTi breakeven



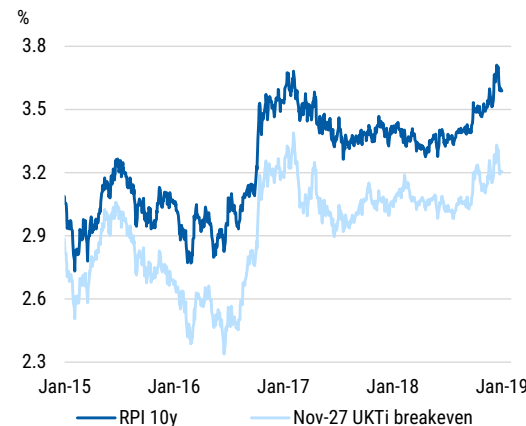
Source: Morgan Stanley Research, Bloomberg

Exhibit 55: 5y RPI & Nov-22 UKTi breakeven



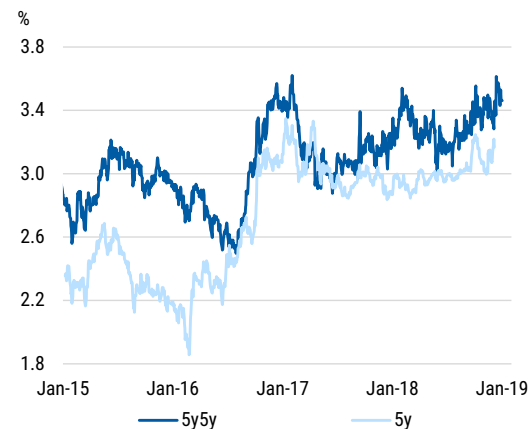
Source: Morgan Stanley Research, Bloomberg

Exhibit 56: 10y RPI & Nov-27 UKTi breakeven



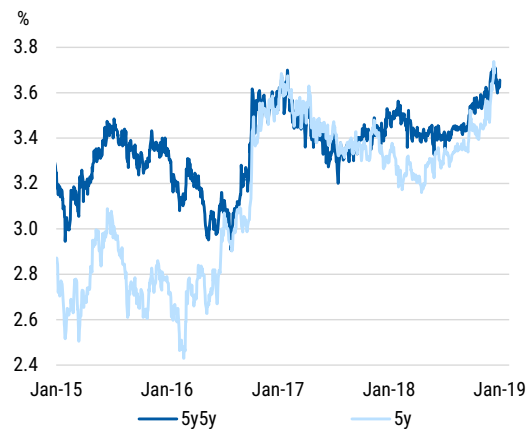
Source: Morgan Stanley Research, Bloomberg

Exhibit 57: 5y5y & 5y UKTi breakevens



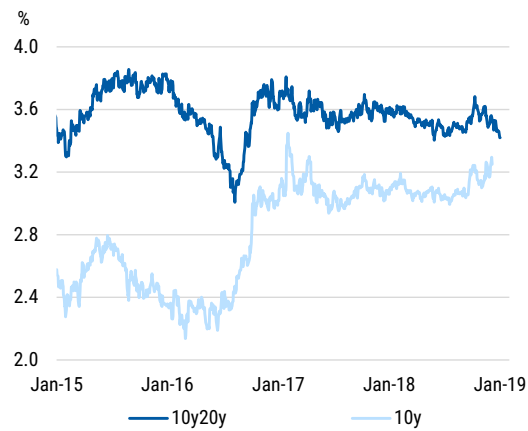
Source: Morgan Stanley Research, Bloomberg

Exhibit 58: 5y5y & 5y RPI breakevens



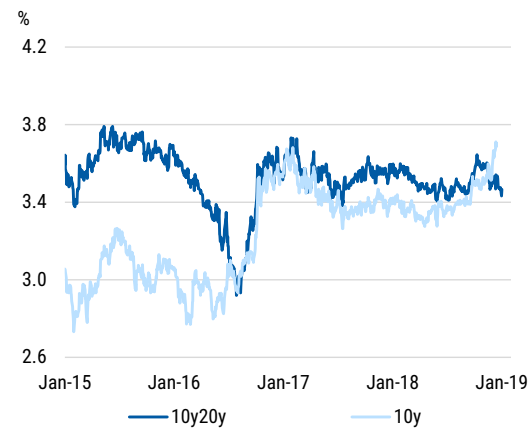
Source: Morgan Stanley Research, Bloomberg

Exhibit 59: 10y20y & 10y UKTi breakevens



Source: Morgan Stanley Research, Bloomberg

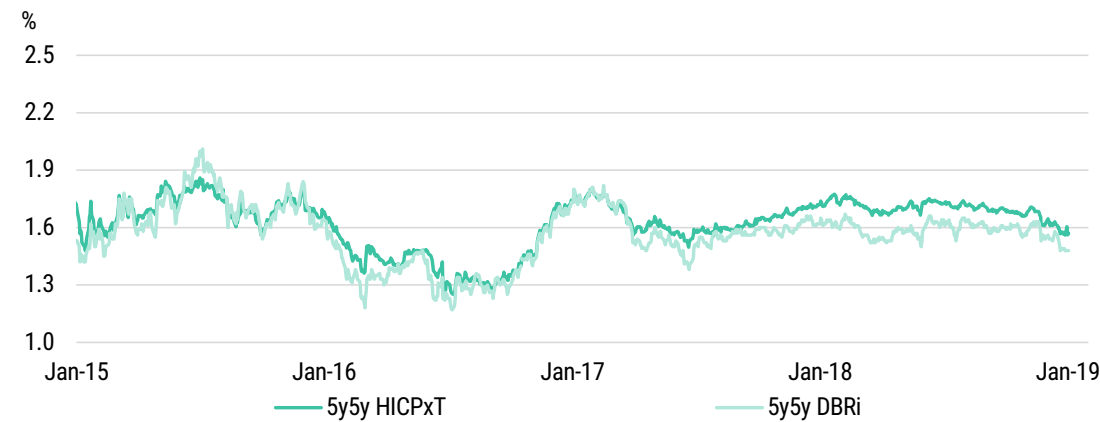
Exhibit 60: 10y20y & 10y RPI breakevens



Source: Morgan Stanley Research, Bloomberg

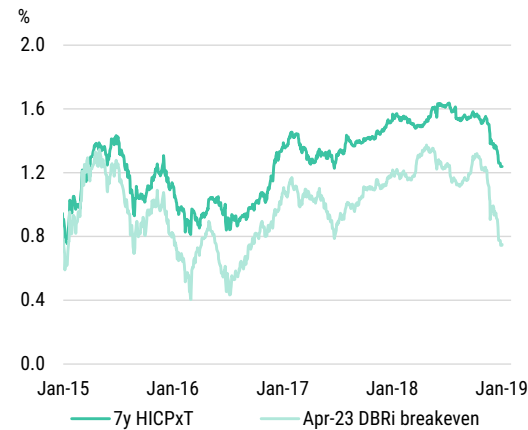
Euro Area

Exhibit 61: 5y5y HICPxT & 5y5y DBRi breakevens



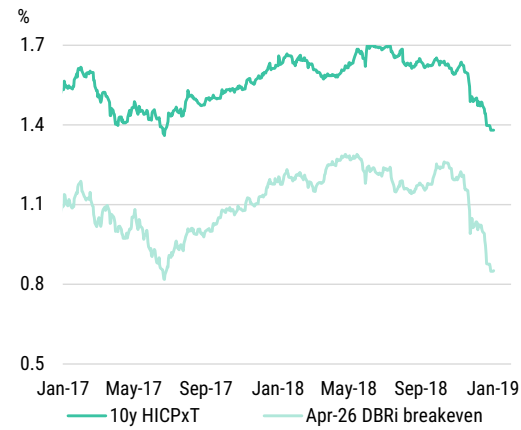
Source: Morgan Stanley Research, Bloomberg

Exhibit 62: 7y HICPxT & Apr-23 DBRi breakeven



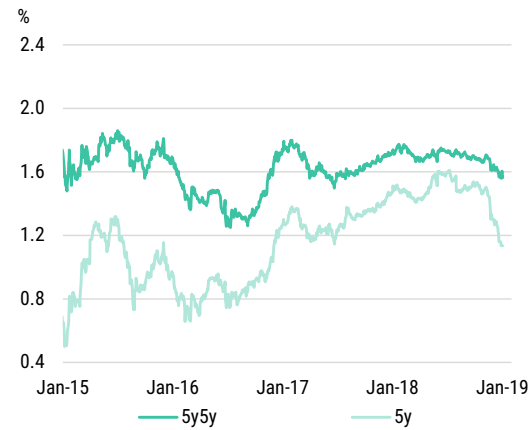
Source: Morgan Stanley Research, Bloomberg

Exhibit 63: 10y HICPxT & Apr-26 DBRi breakeven



Source: Morgan Stanley Research, Bloomberg

Exhibit 64: 5y5y & 5y HICPxT breakevens



Source: Morgan Stanley Research, Bloomberg

Exhibit 65: 10y20y & 10y HICPxT breakevens



Source: Morgan Stanley Research, Bloomberg

Cross-Market

Exhibit 66: UK-US 5y5y swap breakeven spread



Source: Morgan Stanley Research, Bloomberg

Exhibit 67: US-EU 5y5y swap breakeven spread



Source: Morgan Stanley Research, Bloomberg

Exhibit 68: UK-EU 5y5y swap breakeven spread



Source: Morgan Stanley Research, Bloomberg

Exhibit 69: US-JP 5y5y swap breakeven spread



Source: Morgan Stanley Research, Bloomberg

Exhibit 70: UK-JP 5y5y swap breakeven spread



Source: Morgan Stanley Research, Bloomberg

Exhibit 71: EU-JP 5y5y swap breakeven spread

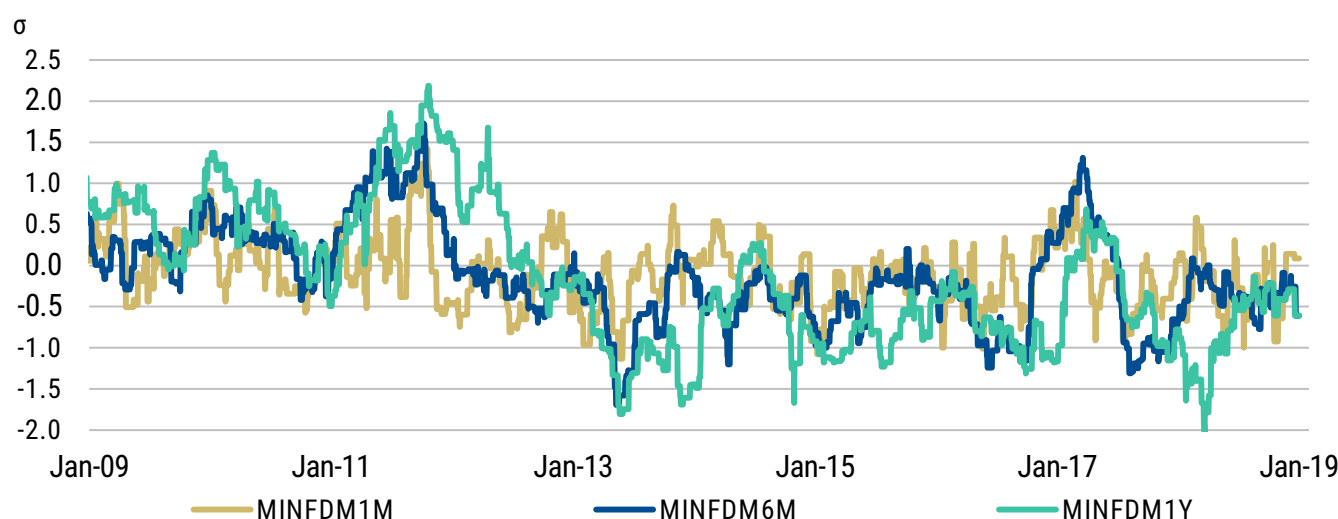


Source: Morgan Stanley Research, Bloomberg

Morgan Stanley developed market inflation surprise indices

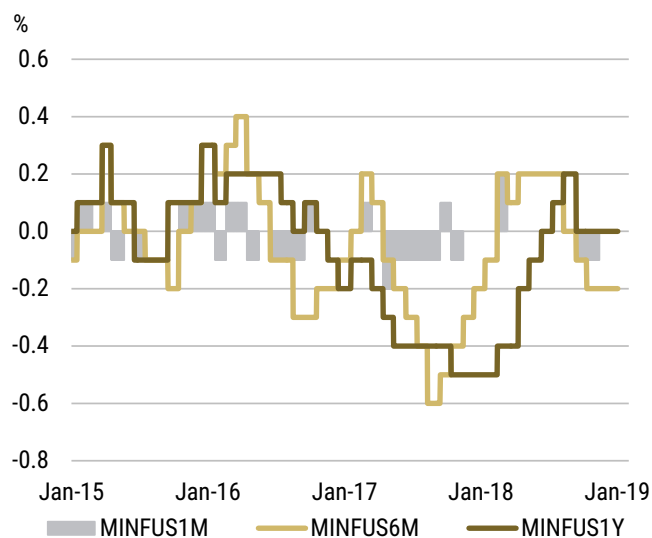
Our Morgan Stanley Inflation Surprise Indices provide a real-time barometer of global inflation relative to consensus expectations. We construct three types of series: individual region actual surprises, 6M & 1Y individual region surprise balances, and normalized DM and EM aggregates of the two. Please refer to the Inflation section of [Global Interest Rate Strategist: The Hors d'œuvre Election \(21 Apr 2017\)](#) for a detailed write-up on index construction and a list of all available Bloomberg tickers.

Exhibit 72: Morgan Stanley DM 1M, 6M & 1Y inflation surprise indices



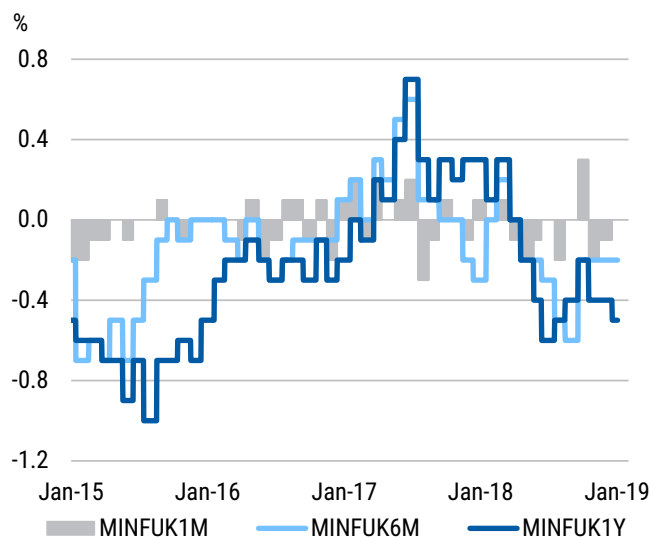
Source: Morgan Stanley Research, Bloomberg

Exhibit 73: Morgan Stanley US 1M, 6M & 1Y inflation surprise indices



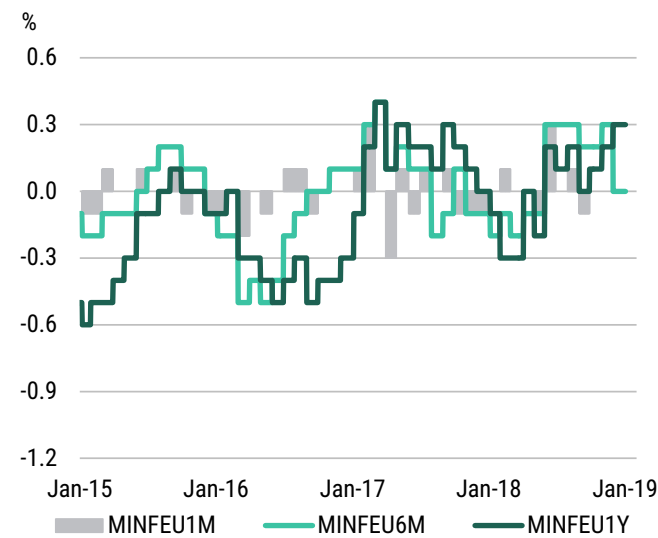
Source: Morgan Stanley Research, Bloomberg

Exhibit 74: Morgan Stanley UK 1M, 6M & 1Y inflation surprise indices



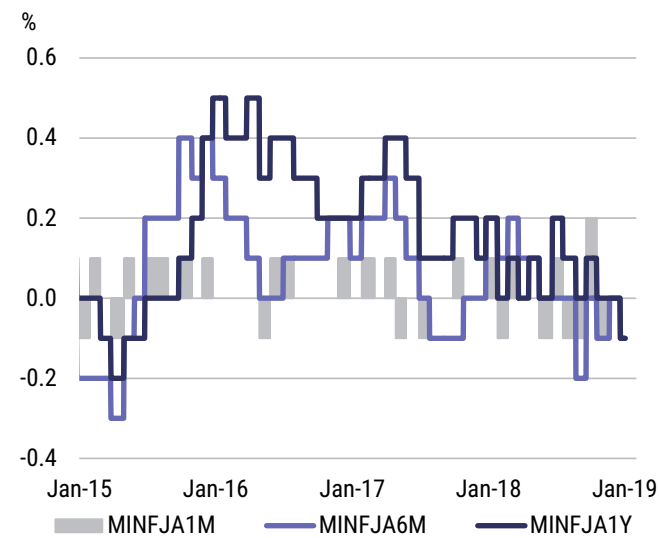
Source: Morgan Stanley Research, Bloomberg

Exhibit 75: Morgan Stanley Euro area 1M, 6M & 1Y inflation surprise indices



Source: Morgan Stanley Research, Bloomberg

Exhibit 76: Morgan Stanley Japan 1M, 6M & 1Y inflation surprise indices



Source: Morgan Stanley Research, Bloomberg

Disclosure Section

The information and opinions in Morgan Stanley Research were prepared or are disseminated by Morgan Stanley & Co. LLC and/or Morgan Stanley C.T.V.M. S.A. and/or Morgan Stanley México, Casa de Bolsa, S.A. de C.V. and/or Morgan Stanley Canada Limited and/or Morgan Stanley & Co. International plc and/or RMB Morgan Stanley Proprietary Limited and/or Morgan Stanley MUFG Securities Co., Ltd. and/or Morgan Stanley Capital Group Japan Co., Ltd. and/or Morgan Stanley Asia Limited and/or Morgan Stanley Asia (Singapore) Pte. (Registration number 199206298Z) and/or Morgan Stanley Asia (Singapore) Securities Pte Ltd (Registration number 200008434H), regulated by the Monetary Authority of Singapore (which accepts legal responsibility for its contents and should be contacted with respect to any matters arising from, or in connection with, Morgan Stanley Research) and/or Morgan Stanley Taiwan Limited and/or Morgan Stanley & Co International plc, Seoul Branch, and/or Morgan Stanley Australia Limited (A.B.N. 67 003 734 576, holder of Australian financial services license No. 233742, which accepts responsibility for its contents), and/or Morgan Stanley Wealth Management Australia Pty Ltd (A.B.N. 19 009 145 555, holder of Australian financial services license No. 240813, which accepts responsibility for its contents), and/or Morgan Stanley India Company Private Limited, regulated by the Securities and Exchange Board of India ("SEBI") and holder of licenses as a Research Analyst (SEBI Registration No. INH000001105), Stock Broker (BSE Registration No. INB011054237 and NSE Registration No. INB/INF231054231), Merchant Banker (SEBI Registration No. INM000011203), and depository participant with National Securities Depository Limited (SEBI Registration No. IN-DP-NSDL-372-2014) which accepts the responsibility for its contents and should be contacted with respect to any matters arising from, or in connection with, Morgan Stanley Research, and/or PT. Morgan Stanley Sekuritas Indonesia and their affiliates (collectively, "Morgan Stanley").

For important disclosures, stock price charts and equity rating histories regarding companies that are the subject of this report, please see the Morgan Stanley Research Disclosure Website at www.morganstanley.com/researchdisclosures, or contact your investment representative or Morgan Stanley Research at 1585 Broadway, (Attention: Research Management), New York, NY, 10036 USA.

For valuation methodology and risks associated with any recommendation, rating or price target referenced in this research report, please contact the Client Support Team as follows: US/Canada +1 800 303-2495; Hong Kong +852 2848-5999; Latin America +1 718 754-5444 (U.S.); London +44 (0)20-7425-8169; Singapore +65 6834-6860; Sydney +61 (0)2-9770-1505; Tokyo +81 (0)3-6836-9000. Alternatively you may contact your investment representative or Morgan Stanley Research at 1585 Broadway, (Attention: Research Management), New York, NY 10036 USA.

Analyst Certification

The following analysts hereby certify that their views about the companies and their securities discussed in this report are accurately expressed and that they have not received and will not receive direct or indirect compensation in exchange for expressing specific recommendations or views in this report: Shreya Chander; Guneet Dhillon, CFA.

Unless otherwise stated, the individuals listed on the cover page of this report are research analysts.

Global Research Conflict Management Policy

Morgan Stanley Research has been published in accordance with our conflict management policy, which is available at www.morganstanley.com/institutional/research/conflict/policies. A Portuguese version of the policy can be found at www.morganstanley.com.br

Important US Regulatory Disclosures on Subject Companies

The equity research analysts or strategists principally responsible for the preparation of Morgan Stanley Research have received compensation based upon various factors, including quality of research, investor client feedback, stock picking, competitive factors, firm revenues and overall investment banking revenues. Equity Research analysts' or strategists' compensation is not linked to investment banking or capital markets transactions performed by Morgan Stanley or the profitability or revenues of particular trading desks.

Morgan Stanley and its affiliates do business that relates to companies/instruments covered in Morgan Stanley Research, including market making, providing liquidity, fund management, commercial banking, extension of credit, investment services and investment banking. Morgan Stanley sells to and buys from customers the securities/instruments of companies covered in Morgan Stanley Research on a principal basis. Morgan Stanley may have a position in the debt of the Company or instruments discussed in this report. Morgan Stanley trades or may trade as principal in the debt securities (or in related derivatives) that are the subject of the debt research report.

Certain disclosures listed above are also for compliance with applicable regulations in non-US jurisdictions.

STOCK RATINGS

Morgan Stanley uses a relative rating system using terms such as Overweight, Equal-weight, Not-Rated or Underweight (see definitions below). Morgan Stanley does not assign ratings of Buy, Hold or Sell to the stocks we cover. Overweight, Equal-weight, Not-Rated and Underweight are not the equivalent of buy, hold and sell. Investors should carefully read the definitions of all ratings used in Morgan Stanley Research. In addition, since Morgan Stanley Research contains more complete information concerning the analyst's views, investors should carefully read Morgan Stanley Research, in its entirety, and not infer the contents from the rating alone. In any case, ratings (or research) should not be used or relied upon as investment advice. An investor's decision to buy or sell a stock should depend on individual circumstances (such as the investor's existing holdings) and other considerations.

Global Stock Ratings Distribution

(as of December 31, 2018)

The Stock Ratings described below apply to Morgan Stanley's Fundamental Equity Research and do not apply to Debt Research produced by the Firm. For disclosure purposes only (in accordance with NASD and NYSE requirements), we include the category headings of Buy, Hold, and Sell alongside our ratings of Overweight, Equal-weight, Not-Rated and Underweight. Morgan Stanley does not assign ratings of Buy, Hold or Sell to the stocks we cover. Overweight, Equal-weight, Not-Rated and Underweight are not the equivalent of buy, hold, and sell but represent recommended relative weightings (see definitions below). To satisfy regulatory requirements, we correspond Overweight, our most positive stock rating, with a buy recommendation; we correspond Equal-weight and Not-Rated to hold and Underweight to sell recommendations, respectively.

STOCK RATING CATEGORY	COVERAGE UNIVERSE		INVESTMENT BANKING CLIENTS (IBC)			OTHER MATERIAL INVESTMENT SERVICES CLIENTS (MISC)	
	COUNT	% OF TOTAL	COUNT	% OF TOTAL IBC	% OF RATING CATEGORY	COUNT	% OF TOTAL OTHER MSC
Overweight/Buy	1143	36%	282	40%	25%	540	38%
Equal-weight/Hold	1428	45%	336	47%	24%	651	46%
Not-Rated/Hold	46	1%	6	1%	13%	6	0%
Underweight/Sell	566	18%	86	12%	15%	232	16%
TOTAL	3,183		710			1429	

Data include common stock and ADRs currently assigned ratings. Investment Banking Clients are companies from whom Morgan Stanley received investment banking compensation in the last 12 months. Due to rounding off of decimals, the percentages provided in the "% of total" column may not add up to exactly 100 percent.

Analyst Stock Ratings

Overweight (O or Over) - The stock's total return is expected to exceed the total return of the relevant country MSCI Index or the average total return of the analyst's industry (or industry team's) coverage universe, on a risk-adjusted basis over the next 12-18 months.

Equal-weight (E or Equal) - The stock's total return is expected to be in line with the total return of the relevant country MSCI Index or the average total return of the analyst's industry (or industry team's) coverage universe, on a risk-adjusted basis over the next 12-18 months.

Not-Rated (NR) - Currently the analyst does not have adequate conviction about the stock's total return relative to the relevant country MSCI Index or the average total return of the analyst's industry (or industry team's) coverage universe, on a risk-adjusted basis, over the next 12-18 months.

Underweight (U or Under) - The stock's total return is expected to be below the total return of the relevant country MSCI Index or the average total return of the analyst's industry (or industry team's) coverage universe, on a risk-adjusted basis, over the next 12-18 months.

Unless otherwise specified, the time frame for price targets included in Morgan Stanley Research is 12 to 18 months.

Analyst Industry Views

Attractive (A): The analyst expects the performance of his or her industry coverage universe over the next 12-18 months to be attractive vs. the relevant broad market benchmark, as indicated below.

In-Line (I): The analyst expects the performance of his or her industry coverage universe over the next 12-18 months to be in line with the relevant broad market benchmark, as indicated below.

Cautious (C): The analyst views the performance of his or her industry coverage universe over the next 12-18 months with caution vs. the relevant broad market benchmark, as indicated below.

Benchmarks for each region are as follows: North America - S&P 500; Latin America - relevant MSCI country index or MSCI Latin America Index; Europe - MSCI Europe; Japan - TOPIX; Asia - relevant MSCI country index or MSCI sub-regional index or MSCI AC Asia Pacific ex Japan Index.

Important Disclosures for Morgan Stanley Smith Barney LLC Customers

Important disclosures regarding the relationship between the companies that are the subject of Morgan Stanley Research and Morgan Stanley Smith Barney LLC or Morgan Stanley or any of their affiliates, are available on the Morgan Stanley Wealth Management disclosure website at www.morganstanley.com/online/researchdisclosures. For Morgan Stanley specific disclosures, you may refer to www.morganstanley.com/researchdisclosures.

Each Morgan Stanley Equity Research report is reviewed and approved on behalf of Morgan Stanley Smith Barney LLC. This review and approval is conducted by the same person who reviews the Equity Research report on behalf of Morgan Stanley. This could create a conflict of interest.

Other Important Disclosures

Morgan Stanley Research policy is to update research reports as and when the Research Analyst and Research Management deem appropriate, based on developments with the issuer, the sector, or the market that may have a material impact on the research views or opinions stated therein. In addition, certain Research publications are intended to be updated on a regular periodic basis (weekly/monthly/quarterly/annual) and will ordinarily be updated with that frequency, unless the Research Analyst and Research Management determine that a different publication schedule is appropriate based on current conditions. Morgan Stanley is not acting as a municipal advisor and the opinions or views contained herein are not intended to be, and do not constitute, advice within the meaning of Section 975 of the Dodd-Frank Wall Street Reform and Consumer Protection Act.

Morgan Stanley produces an equity research product called a "Tactical Idea." Views contained in a "Tactical Idea" on a particular stock may be contrary to the recommendations or views expressed in research on the same stock. This may be the result of differing time horizons, methodologies, market events, or other factors. For all research available on a particular stock, please contact your sales representative or go to Matrix at <http://www.morganstanley.com/matrix>.

Morgan Stanley Research is provided to our clients through our proprietary research portal on Matrix and also distributed electronically by Morgan Stanley to clients. Certain, but not all, Morgan Stanley Research products are also made available to clients through third-party vendors or redistributed to clients through alternate electronic means as a convenience. For access to all available Morgan Stanley Research, please contact your sales representative or go to Matrix at <http://www.morganstanley.com/matrix>.

Any access and/or use of Morgan Stanley Research is subject to Morgan Stanley's Terms of Use (<http://www.morganstanley.com/terms.html>). By accessing and/or using Morgan Stanley Research, you are indicating that you have read and agree to be bound by our Terms of Use (<http://www.morganstanley.com/terms.html>). In addition you consent to Morgan Stanley processing your personal data and using cookies in accordance with our Privacy Policy and our Global Cookies Policy (http://www.morganstanley.com/privacy_pledge.html), including for the purposes of setting your preferences and to collect readership data so that we can deliver better and more personalized service and products to you. To find out more information about how Morgan Stanley processes personal data, how we use cookies and how to reject cookies see our Privacy Policy and our Global Cookies Policy (http://www.morganstanley.com/privacy_pledge.html).

If you do not agree to our Terms of Use and/or if you do not wish to provide your consent to Morgan Stanley processing your personal data or using cookies please do not access our research.

Morgan Stanley Research does not provide individually tailored investment advice. Morgan Stanley Research has been prepared without regard to the

circumstances and objectives of those who receive it. Morgan Stanley recommends that investors independently evaluate particular investments and strategies, and encourages investors to seek the advice of a financial adviser. The appropriateness of an investment or strategy will depend on an investor's circumstances and objectives. The securities, instruments, or strategies discussed in Morgan Stanley Research may not be suitable for all investors, and certain investors may not be eligible to purchase or participate in some or all of them. Morgan Stanley Research is not an offer to buy or sell or the solicitation of an offer to buy or sell any security/instrument or to participate in any particular trading strategy. The value of and income from your investments may vary because of changes in interest rates, foreign exchange rates, default rates, prepayment rates, securities/instruments prices, market indexes, operational or financial conditions of companies or other factors. There may be time limitations on the exercise of options or other rights in securities/instruments transactions. Past performance is not necessarily a guide to future performance. Estimates of future performance are based on assumptions that may not be realized. If provided, and unless otherwise stated, the closing price on the cover page is that of the primary exchange for the subject company's securities/instruments.

The fixed income research analysts, strategists or economists principally responsible for the preparation of Morgan Stanley Research have received compensation based upon various factors, including quality, accuracy and value of research, firm profitability or revenues (which include fixed income trading and capital markets profitability or revenues), client feedback and competitive factors. Fixed Income Research analysts', strategists' or economists' compensation is not linked to investment banking or capital markets transactions performed by Morgan Stanley or the profitability or revenues of particular trading desks.

The "Important US Regulatory Disclosures on Subject Companies" section in Morgan Stanley Research lists all companies mentioned where Morgan Stanley owns 1% or more of a class of common equity securities of the companies. For all other companies mentioned in Morgan Stanley Research, Morgan Stanley may have an investment of less than 1% in securities/instruments or derivatives of securities/instruments of companies and may trade them in ways different from those discussed in Morgan Stanley Research. Employees of Morgan Stanley not involved in the preparation of Morgan Stanley Research may have investments in securities/instruments or derivatives of securities/instruments of companies mentioned and may trade them in ways different from those discussed in Morgan Stanley Research. Derivatives may be issued by Morgan Stanley or associated persons.

With the exception of information regarding Morgan Stanley, Morgan Stanley Research is based on public information. Morgan Stanley makes every effort to use reliable, comprehensive information, but we make no representation that it is accurate or complete. We have no obligation to tell you when opinions or information in Morgan Stanley Research change apart from when we intend to discontinue equity research coverage of a subject company. Facts and views presented in Morgan Stanley Research have not been reviewed by, and may not reflect information known to, professionals in other Morgan Stanley business areas, including investment banking personnel.

Morgan Stanley Research personnel may participate in company events such as site visits and are generally prohibited from accepting payment by the company of associated expenses unless pre-approved by authorized members of Research management.

Morgan Stanley may make investment decisions that are inconsistent with the recommendations or views in this report.

To our readers based in Taiwan or trading in Taiwan securities/instruments: Information on securities/instruments that trade in Taiwan is distributed by Morgan Stanley Taiwan Limited ("MSTL"). Such information is for your reference only. The reader should independently evaluate the investment risks and is solely responsible for their investment decisions. Morgan Stanley Research may not be distributed to the public media or quoted or used by the public media without the express written consent of Morgan Stanley. Any non-customer reader within the scope of Article 7-1 of the Taiwan Stock Exchange Recommendation Regulations accessing and/or receiving Morgan Stanley Research is not permitted to provide Morgan Stanley Research to any third party (including but not limited to related parties, affiliated companies and any other third parties) or engage in any activities regarding Morgan Stanley Research which may create or give the appearance of creating a conflict of interest. Information on securities/instruments that do not trade in Taiwan is for informational purposes only and is not to be construed as a recommendation or a solicitation to trade in such securities/instruments. MSTL may not execute transactions for clients in these securities/instruments.

Certain information in Morgan Stanley Research was sourced by employees of the Shanghai Representative Office of Morgan Stanley Asia Limited for the use of Morgan Stanley Asia Limited.

Morgan Stanley is not incorporated under PRC law and the research in relation to this report is conducted outside the PRC. Morgan Stanley Research does not constitute an offer to sell or the solicitation of an offer to buy any securities in the PRC. PRC investors shall have the relevant qualifications to invest in such securities and shall be responsible for obtaining all relevant approvals, licenses, verifications and/or registrations from the relevant governmental authorities themselves. Neither this report nor any part of it is intended as, or shall constitute, provision of any consultancy or advisory service of securities investment as defined under PRC law. Such information is provided for your reference only.

Morgan Stanley Research is disseminated in Brazil by Morgan Stanley C.T.V.M. S.A. located at Av. Brigadeiro Faria Lima, 3600, 6th floor, São Paulo - SP, Brazil; and is regulated by the Comissão de Valores Mobiliários; in Mexico by Morgan Stanley México, Casa de Bolsa, S.A. de C.V. which is regulated by Comisión Nacional Bancaria y de Valores. Paseo de los Tamarindos 90, Torre 1, Col. Bosques de las Lomas Floor 29, 05120 Mexico City; in Japan by Morgan Stanley MUFG Securities Co., Ltd. and, for Commodities related research reports only, Morgan Stanley Capital Group Japan Co., Ltd; in Hong Kong by Morgan Stanley Asia Limited (which accepts responsibility for its contents) and by Morgan Stanley Asia International Limited, Hong Kong Branch; in Singapore by Morgan Stanley Asia (Singapore) Pte. (Registration number 199206298Z) and/or Morgan Stanley Asia (Singapore) Securities Pte Ltd (Registration number 200008434H), regulated by the Monetary Authority of Singapore (which accepts legal responsibility for its contents and should be contacted with respect to any matters arising from, or in connection with, Morgan Stanley Research) and by Morgan Stanley Asia International Limited, Singapore Branch (Registration number T11FC0207F); in Australia to "wholesale clients" within the meaning of the Australian Corporations Act by Morgan Stanley Australia Limited A.B.N. 67 003 734 576, holder of Australian financial services license No. 233742, which accepts responsibility for its contents; in Australia to "wholesale clients" and "retail clients" within the meaning of the Australian Corporations Act by Morgan Stanley Wealth Management Australia Pty Ltd (A.B.N. 19 009 145 555, holder of Australian financial services license No. 240813, which accepts responsibility for its contents; in Korea by Morgan Stanley & Co International plc, Seoul Branch; in India by Morgan Stanley India Company Private Limited; in Indonesia by PT. Morgan Stanley Sekuritas Indonesia; in Canada by Morgan Stanley Canada Limited, which has approved of and takes responsibility for its contents in Canada; in Germany by Morgan Stanley Bank AG, Frankfurt am Main and Morgan Stanley Private Wealth Management Limited, Niederlassung Deutschland, regulated by Bundesanstalt fuer Finanzdienstleistungsaufsicht (BaFin); in Spain by Morgan Stanley, S.V., S.A., a Morgan Stanley group company, which is supervised by the Spanish Securities Markets Commission (CNMV) and states that Morgan Stanley Research has been written and distributed in accordance with the rules of conduct applicable to financial research as established under Spanish regulations; in the US by Morgan Stanley & Co. LLC, which accepts responsibility for its contents. Morgan Stanley & Co. International plc, authorized by the Prudential Regulatory Authority and regulated by the Financial Conduct Authority and the Prudential Regulatory Authority, disseminates in the UK research that it has prepared, and approves solely for the purposes of section 21 of the Financial Services and Markets Act 2000, research which has been prepared by any of its affiliates. RMB Morgan Stanley Proprietary Limited is a member of the JSE Limited and regulated by the Financial Services Board in South Africa. RMB Morgan Stanley Proprietary Limited is a joint venture owned equally by Morgan Stanley International Holdings Inc. and RMB Investment Advisory (Proprietary) Limited, which is wholly owned by FirstRand Limited. The information in Morgan Stanley Research is being disseminated by Morgan Stanley Saudi Arabia, regulated by the Capital Market Authority in the Kingdom of Saudi Arabia, and is directed at Sophisticated investors only.

The information in Morgan Stanley Research is being communicated by Morgan Stanley & Co. International plc (DIFC Branch), regulated by the Dubai Financial Services Authority (the DFSA), and is directed at Professional Clients only, as defined by the DFSA. The financial products or financial services to which this research relates will only be made available to a customer who we are satisfied meets the regulatory criteria to be a Professional Client.

The information in Morgan Stanley Research is being communicated by Morgan Stanley & Co. International plc (QFC Branch), regulated by the Qatar Financial Centre Regulatory Authority (the QFCRA), and is directed at business customers and market counterparties only and is not intended for Retail

Customers as defined by the QFCRA.

As required by the Capital Markets Board of Turkey, investment information, comments and recommendations stated here, are not within the scope of investment advisory activity. Investment advisory service is provided exclusively to persons based on their risk and income preferences by the authorized firms. Comments and recommendations stated here are general in nature. These opinions may not fit to your financial status, risk and return preferences. For this reason, to make an investment decision by relying solely to this information stated here may not bring about outcomes that fit your expectations.

The trademarks and service marks contained in Morgan Stanley Research are the property of their respective owners. Third-party data providers make no warranties or representations relating to the accuracy, completeness, or timeliness of the data they provide and shall not have liability for any damages relating to such data. The Global Industry Classification Standard (GICS) was developed by and is the exclusive property of MSCI and S&P.

Morgan Stanley Research, or any portion thereof may not be reprinted, sold or redistributed without the written consent of Morgan Stanley.

Indicators and trackers referenced in Morgan Stanley Research may not be used as, or treated as, a benchmark under Regulation EU 2016/1011, or any other similar framework.

© 2019 Morgan Stanley