

January 4, 2019 11:07 PM GMT

## US Economics &amp; Rates Strategy | North America

Treasury Market Commentary,  
January 4

A very strong US payrolls report and policy easing in China support risk assets pushing UST yields higher led by wider inflation breakevens and cheapening in the belly. 5y USTs saw the largest 1-day sell-off since the 2016 US elections, but remain 54bp off their peak. 10y yields closed at 2.67%.

**US equity markets surged, inflation breakevens widened substantially and yesterday's significant rally in US Treasuries was unwound as the combination of Chinese easing/cuts to the RRR, a large gain for US nonfarm payrolls both relative to consensus and in outright terms, and more balanced comments about the outlook for future interest rate increases from the Fed's Powell and Mester contributed to the better tone.** In China, the PBoC announced two 50bp RRR cuts effective January 15 and January 25, that are expected to release up to as much as RMB 1.5tn of liquidity (**see [China Economics: PBoC Conducts 100bps Broad-Based RRR Cut](#)**). While in the US, nonfarm payrolls surprised to the upside with upward revisions after **rising 312k in December versus an expected gain of 184k at the same time that average hourly earnings growth rose 0.4%, pushing the YoY rate up to 3.2%.** Following today's significant rise in treasury yields post NFP, **market expectations for a Fed cut in the first half of 2019 were taken out of the fed funds curve with the pricing of one 25bp cut by the end of January 2020 dropping below 50%.** For further detail about today's NFP report please see a report from our US economics team titled, **"Payrolls & Wages: Ending the Year on a Strong Note"**.

Looking forward to next week, focus will likely shift to heavy government bond supply expected in the US, Europe and Japan where intermediate to longer maturity auctions are currently scheduled in the US, UK, Germany, France, Italy, the Netherlands, Austria, and possibly Ireland and Japan. Minutes from the most recent FOMC and ECB meetings will be released on Wednesday and Thursday, respectively, while the Bank of Canada is currently priced to keep the overnight lending rate unchanged at 1.75% during its meeting on Wednesday. Major data releases include the US services PMI on Monday, updated Eurostat confidence surveys on Tuesday, Chinese CPI data midweek and US CPI data on Friday.

**JGBs significantly bull steepened overnight after the extended holiday, likely in response to yesterday's significant rally in US treasuries and aided in part by a strong purchase operation in the 5-10y bucket, as the 10y yield closed in negative territory for the first time since November 2016.** The 10y JGB yield declined 4.1bp to -0.038% while the 5s30s curve in Japan flattened 1.4bp to 84.7bp. Looking forward to next week, focus will likely shift to the outcome of

MORGAN STANLEY &amp; CO. LLC

<b>Tony Small</b> STRATEGIST Tony.Small@morganstanley.com	+1 212 296-5876
<b>Matthew Hornbach</b> STRATEGIST Matthew.Hornbach@morganstanley.com	+1 212 761-1837
<b>Robert Rosener</b> ECONOMIST Robert.Rosener@morganstanley.com	+1 212 296-5614
<b>Molly Wharton</b> ECONOMIST Molly.Wharton@morganstanley.com	+1 212 296-8054
<b>Guneet Dhingra, CFA</b> STRATEGIST Guneet.Dhingra@morganstanley.com	+1 212 761-1445
<b>Sam Elprince</b> STRATEGIST Sam.Elprince@morganstanley.com	+1 212 761-9491
<b>David Harris</b> STRATEGIST David.G.Harris@morganstanley.com	+1 212 761-0087

Robert Rosener and Molly Wharton are Economists and are not opining on any securities.

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.

both the 10y and 30y auctions.

**Periphery spreads were modestly tighter today led by Greece following yesterday's notable widening in Italy.** The Italian, Portuguese, Spanish and Greek 10y spreads to 10y German Bunds tightened 1.5bp, 1.4bp, 0.8bp and 5.8bp, respectively. Outright levels for periphery 10y yields were higher consistent with the yield increases observed across developed bond markets. The outright level of the Italian 10y yield rose 4bp to 2.90%. Curves across the semi-core and periphery were mostly steeper. 5s30s curves in France, Spain and Italy steepened 0.2bp, 1.8bp and 6.6bp, respectively, while the 5s30s curve in Belgium flattened 0.2bp. **Heavy supply in Europe will likely be the focus for the periphery next week with auctions expected in France, Italy, the Netherlands, Austria and possibly Ireland.**

**German Bund yields and UK Gilt yields both rose significantly today coincident with the sharp rise in treasury yields that occurred both overnight and following the release of nonfarm payroll data.** Both Bund and Gilt yields began gradually drifting higher early in the session coincident with the rebound in US treasury yields that began during trading in Asia. Bunds and Gilts extended the early session rise in yield following the release of nonfarm payrolls and commentary from Fed Chair Powell. Both 10y Bund and 10y Gilt yields finished the session near their highest yield levels of the day with 10y Gilts widening more than 2.5bp versus 10y Bunds, but both markets outperforming 10y US treasuries at their closes. Inflation breakevens in both the UK and Germany were modestly wider coincident with the significant widening in US breakevens today. The 10y Gilt yield ended the session up 5.5bp to 0.208% while the 10y Gilt yield climbed 8.2bp to 1.276%. **Today's downside surprise in Euro Area headline CPI, which brought CPI below the ECB's target for 2018, appeared to have little impact on the market perhaps in part due to the fact that Core CPI was stable, suggesting that most of the downside surprise was due to headline sectors.** Both the UK and Germany are scheduled to auction 10y paper next week.

Following the strong NFP release, USTs sold off further into the afternoon following comments from Fed Chairman Powell that emphasized the continued strength in the economy while acknowledging that the FOMC would be prepared to change course if the outlook shifts. **By end of trading in New York, 10y UST yields were 11bp higher on the day with most of the cheapening driven by wider inflation breakevens.** The belly of the curve cheapened the most as the market reduced the expected likelihood of rate cuts over the coming years and risk assets soaring on the back of the strong jobs data and planned policy easing in China.

The market's risk on mode was reflected in the S&P 500 index rising 3.4% on the day, while the VIX fell 4 points to its lowest level since mid-December, and high yield CDX tightened 35bp on the day, the largest single-day tightening in the index since 2014. The USD weakened very strongly versus emerging markets and commodity currencies such as ZAR, TRY, CAD, and AUD.

Mixed reports about progress in negotiations regarding the US government shutdown failed to faze the rally in risk assets in the afternoon as Congress and the White House are expected to continue budget negotiations over the weekend.

**Tactical Trading Model Signals - Currently Active Strategies**

**G4 10y Futures Smarter (beta) Trading Strategy - A "Smarter" (beta) Way to Trade G4 10y Futures Duration?** (please see [Exhibit 13](#) found later in this publication for detailed breakdown)

- **US 10y** Futures Exposure: Total 0%, Trade Longs Only 0%, Fade Shorts Portfolio: 0%.
- **German 10y** Futures Exposure: Total 0%, Trade Longs Only 0%, Fade Shorts Portfolio: 0%.
- **Japan 10y** Futures Exposure: Total 0%, Trade Longs Only 0%, Fade Shorts Portfolio: 0%.
- **UK 10y** Futures Exposure: Total 200%, Trade Longs Only 100%, Fade Shorts Portfolio: 100%.

**Trading Notes: Today, Friday January 4, 2019, the G4 Smarter Beta strategy bought the 10y UK Gilt future at the local market close in the Trade Longs Only portfolio after the 5-day moving average closed back above the 20-day moving average yesterday in line with the T+1 execution trading rule.** On December 24, 2018, the 5-day moving average for the 10y Gilt future had closed below the 20-day moving average resulting in a trading signal in the Fade Shorts portfolio. Following tomorrow's execution, the UK 10y Trade Longs/Fade Shorts portfolio will be at a maximum 200% long position. Per the strategy trading rules, should a full 25 business days pass without another long signal being generated in the Trade Longs Only portfolio, the anticipated exit date for tomorrow's purchase will be February 8, 2019.

**US Holiday Trading Strategy - Trading 10y Treasury Futures Around US Holidays**

**The US Holiday Trading Strategy is currently Active.** On Wednesday January 2, 2019, the US Holiday trading strategy bought the actively traded US 10y treasury future (TYH9) at 3pm New York time one business day after the New Years Holiday. It will sell/close that position on Monday January 7, 2019 at 3pm New York time four business days after the New Year's holiday. Per the strategy trading rules, the US Holiday Trading Strategy will buy/go long US 10y treasury futures on the first business day of the New Year at 3pm New York time and sell/exit that position on the 4th business day of the New Year at 3pm New York time.

**At 3:00 PM New York, Treasury yields finished higher across the curve led by the 3y note.** The 2y yield rose 9.8bp to 2.486%, the 3y rose 11.6bp to 2.463%, the 5y rose 11.5bp to 2.482%, the 7y rose 11.2bp to 2.547%, the 10y rose 10.4bp to 2.658%, and the 30y rose 7.3bp to 2.974%.

**Market-implied probabilities for a hike at the Fed's March FOMC meeting increased on Friday to -2% from -12%.** Over the next 12 months, the market is pricing -10.5bp of cumulative cuts.

**TIPS breakevens finished mostly higher across the curve led by the 2y BEI.** The 2y BEI rate rose 12.2bp to 0.77%, the 5y rose 10.3bp to 1.58%, the 10y rose 8.2bp

to 1.76%, and the 30y rose 4.3bp to 1.82%. **TIPS real yields ended mostly higher led by the 5y TIPS.** The 2y TIPS real yield fell 0.8bp to 1.78%, the 5y rose 4.2bp to 0.91%, the 10y rose 3.3bp to 0.90%, and the 30y rose 3.7bp to 1.17%.

**Swap spreads closed higher Friday led by the 30y sector.** 2y spreads fell 0.2bp to 15.3bp, 3y spreads fell 0.4bp to 10.3bp, 5y spreads rose 1.0bp to 7.0bp, 7y spreads rose 1.1bp to 5.2bp, 10y spreads rose 1.3bp to 3.0bp, and 30y spreads rose 1.5bp to -16.5bp.

Please [click here](#) if you would like to receive our weekly strategic advice on global interest rates: the [Global Interest Rate Strategist](#).

### US Treasury cash and futures pivot points

[Exhibit 1](#) and [Exhibit 2](#) display daily pivot points, support, and resistance levels for each benchmark Treasury and front Treasury futures contract. We explain our methodology and include weekly pivot points, support, and resistance levels inside the report.

**Exhibit 1:** US Treasury benchmark daily pivots, support, and resistance levels

	UST 2y	UST 3y	UST 5y	UST 7y	UST 10y	UST 30y
Daily resistance 3	2.581	2.579	2.608	2.658	2.762	3.062
Daily resistance 2	2.560	2.553	2.581	2.634	2.738	3.042
Daily resistance 1	2.534	2.523	2.549	2.604	2.710	3.021
Daily pivot high	2.467	2.444	2.467	2.529	2.640	2.964
Daily pivot low	2.456	2.431	2.454	2.517	2.628	2.954
Daily Support 1	2.434	2.405	2.427	2.493	2.604	2.934
Daily Support 2	2.408	2.374	2.395	2.463	2.577	2.913
Daily Support 3	2.379	2.339	2.358	2.430	2.545	2.887

Source: Morgan Stanley Research

**Exhibit 2:** US Treasury futures daily pivots, support, and resistance levels

	TU1	FV1	TY1	UXY1	US1	WN1
Daily resistance 3	106-156	115-203	123-200	132-067	149-210	165-223
Daily resistance 2	106-123	115-115	123-06+	131-207	148-25+	164-153
Daily resistance 1	106-103	115-062	122-300	131-096	148-08+	163-232
Daily pivot high	106-070	114-293	122-16+	130-237	147-130	162-163
Daily pivot low	106-062	114-272	122-133	130-196	147-06+	162-062
Daily Support 1	106-035	114-205	122-028	130-057	146-17+	161-093
Daily Support 2	106-015	114-152	121-26+	129-266	146-00+	160-172
Daily Support 3	105-317	114-107	121-192	129-170	145-180	159-30+

Source: Morgan Stanley Research

### Economic data recap

The **December employment report** was very solid, with nonfarm payrolls rising 312,000, beating consensus expectations by the largest margin (128,000) since May 2009. Moreover, revisions to the job growth figures for November and December added a net 58,000 jobs. Alongside strong job growth, data on wages were also strong for December, with average hourly earnings rise 0.4%Mo, bringing the year-over-year rate up to 3.2%. For details, see [US Economics: Payrolls & Wages: Ending the Year on a Strong Note, 4 Jan 2019](#).

### GDP tracking

Incorporating our forecasts for upcoming data releases lowered our **4Q GDP tracking to 3.5%** from 3.6%. The Atlanta Fed's [GDPNow](#) is at 2.6% for 4Q18. The New York Fed's [Nowcast](#) is at 2.5% for 4Q18. The St. Louis Fed's [Economic News Index](#) is at 2.6% for 4Q18.

**Economic data preview**

Shutdown update: With the continued government shutdown, the Department of Commerce's Bureau of Economic Analysis (BEA) and Census Bureau remain closed and are not publishing economic data. The Bureau of Labor Statistics (BLS) and Federal Reserve are unaffected; thus, next week's inflation data and the FOMC minutes will be released as usual. Private sector data will also be released on schedule, including the ISM nonmanufacturing survey.

Key data releases next week include:

- **Consumer Price Index (Friday, 8:30am):** We expect core CPI to post a solid 0.24% month-over-month gain in December, which would mark the strongest print since July. Our forecast is driven by an acceleration in both core goods (+0.19% in December after +0.16% in November) and core services (+0.25% after +0.21%). Declining oil prices continue to hold down energy prices in CPI, which we expect to post a large 4.0% drop. Only partially offset by a 0.3% gain in food prices in our forecast, this implies a 0.10% decline in headline CPI. A print in line with our forecasts would keep core CPI at 2.2% on a year-over-year basis, while year-over-year headline CPI growth would come down to 1.9% from 2.2% in November.

We also await the already delayed releases of new home sales and construction spending. Here are our expectations:

- **New Home Sales:** We find new home sales poised for a large rebound in November after a 8.9% drop in October. We expect new home sales to rebound by 10.5%, bringing the annualized pace of sales up to a 602,000 unit pace.
- **Construction Spending:** We look for construction spending to rebound in November with a 1.2% gain following three consecutive declines.

**Fedspeak:**

Highlights from Cleveland Fed President **Mester's** interview with CNBC:

*There's a lot of currents affecting the markets. I don't think it's all about their assessment of Fed policy. I think there are downside risks to the economy. We've seen some slowdown in Europe and in China. We saw the ISM index still showing growth in manufacturing but at a slower pace.*

*I think the markets are putting a lot of emphasis on the downside risks. There are also some upside risks, and now we're trying to calibrate our policy to that outlook. But again, we're going to take the signals that we're getting from the market.*

*I don't think we're ahead of the curve. I don't think we're behind the curve. I think we're in a really good spot.*

*We can take time. We don't have inflation running ahead, we don't see it accelerating.*

*I think we're in a range of estimates of neutral....If we don't see inflation picking up and we see the labor market staying reasonably strong from where we are now, then that may tell us we're at neutral.*

*I've been very supportive of what we're doing with the balance sheet. I don't*

*think at this point I'm going to reconsider the balance sheet. But I don't agree with the interpretation out there that we have forgotten about the balance sheet.*

*We always left open the fact that if the economy deteriorates and we need to change our balance sheet policy, we are going to be changing the balance sheet policy. So it's on autopilot in the extent of we've set a plan, we've set out what it was, we wanted the markets to understand what the plan was. But if the economy deteriorates in a way that necessitates changing that plan, we are willing to do it. I don't foresee that happening in the economy at this point but we've been open to that and we've said publicly that that's what we plan to do.*

Highlights from Fed Chair **Powell's** panel discussion at the annual AEA meeting:

*It's [ISM] now at a level which is considered consistent with ongoing moderate growth...I would say the fact that it moved down so much in one month is something worth keeping an eye on.*

*Average hourly earnings moved up and that's quite welcome and also for me at this time does not raise concerns about too-high inflation.*

*Good data still I think is the story looking in the rearview mirror, but financial markets have been sending different signals—signals of concern about downside risk, about slowing global growth particularly related to China, about ongoing trade negotiations, about maybe let's call generally policy uncertainty coming out of Washington, among other factors. So you do have this difference between on the one hand between strong data and some tension between financial markets that are signaling concern and downside risk.*

*I think the markets are pricing in downside risk...and I think they are obviously well ahead of the data.*

*Markets are expressing concerns about global growth in particular...we're listening carefully to that. We're listening sensitively to the message that markets are sending and we're going to be taking those downside risks into account.*

*There is no preset path for policy. And particularly, with the muted inflation readings that we've seen coming in, we will be patient as we watch to see how the economy evolves. But we're always prepared to shift the stance of policy and to shift it significantly if necessary.*

*We said that we would be prepared to adjust our normalization plans as appropriate to achieve our goals. So if we ever came to the conclusion that any aspect of our normalization plans was somehow interfering with our achievement of our statutory goals, we wouldn't hesitate to change it, and that would include the balance sheet certainly.*

*I would say today, we're hearing a lot from different groups of people about the role that the balance sheet normalization may be playing in the markets... We don't believe that our issuance is an important part of the story of the market turbulence that began in the fourth quarter last year. But if we reach*

*a different conclusion, we wouldn't hesitate to make a change. If we came to the view that the balance sheet normalization plan or any other aspect of normalization was part of the problem, we wouldn't hesitate to make a change.*

Highlights from Richmond Fed President **Barkin**'s speech on "The Outlook for Growth" at the Maryland Bankers Association in Baltimore:

*If you think we are on a pre-set path of some sort that has locked and loaded independent of what happens in the economy, that's not how we think.*

*I forecast growth to continue this year, though at a somewhat slower pace.*

*As we enter 2019, I hear a lot of concern. Some is environmental, driven by trade or politics. Some is market driven, as volatility has increased and the yield curve has narrowed. Some is margin pressure.*

#### Fedspeak preview:

- Monday (12:40pm): Atlanta Fed President **Bostic** speaks to the Rotary Club of Atlanta.
- Wednesday (8:20am): Atlanta Fed President **Bostic** speaks on the economic outlook to the Chattanooga Chamber of Commerce.
- Wednesday (9am): Chicago Fed President **Evans** speaks on the economy and monetary policy at a Discover Financial Services company meeting.
- Wednesday (11:30am): Boston Fed President **Rosengren** speaks on the economic outlook to the Boston Economic Club.
- Thursday (8:35am): Richmond Fed President **Barkin** speaks on Long-Term Growth at a Raleigh Chamber of Commerce breakfast.
- Thursday (12pm): Fed Chair **Powell** speaks to the Economic Club of Washington.
- Thursday (12:40pm): St. Louis Fed President **Bullard** speaks on the economy and monetary policy to the Little Rock Chamber of Commerce.
- Thursday (1pm): Chicago Fed President **Evans** discusses the economy and monetary policy at the Milwaukee Business Journal Economic Forecast event.
- Thursday (5:30pm): Fed Vice Chair **Clarida** speaks to the Monetary Marketeers of NYU.

**Thursday (Tactical Trading Model Signals - Currently Inactive Strategies**

**US Payroll Trading Strategy - Buy 10y Treasury Futures on a Strong Payroll Beat**

The US Payroll Trading Strategy will Buy the actively traded US 10y Treasury future (TY) at 3pm New York time on the day of the payroll release and hold for 5 business days before closing the position at 3pm New York time, when US Nonfarm Payrolls beat the consensus estimate by 20,000 or greater.

#### Auction Outlook - [An American Auction Tail](#)

Our next Auction Preview will take place on January 7, in advance of the 3-year auction on December 8.

#### Additional content inside

- [Event calendar](#)
- [Pivot Points](#)
- [Technical Analysis](#)
- [Cyclical and Secular Trends](#)
- [G4 Smarter \(beta\) Trading Strategy](#)
- [Holiday Trading Strategy](#)
- [Market data](#)
- [In case you missed it](#)

#### Exhibit 3: Treasury market closes

Maturity	3PM YTM (%)	1d Δ (bp)	5PM YTM (%)	3~5PM Δ (bp)
2y	2.486	9.8	2.494	0.8
3y	2.463	11.6	2.475	1.2
5y	2.482	11.5	2.501	1.8
7y	2.547	11.2	2.561	1.4
10y	2.658	10.4	2.668	1.0
30y	2.974	7.3	2.981	0.7

Source: Morgan Stanley Research, Bloomberg

Note: All times listed in the Treasury Market Commentary are New York time.



## Event Calendar

#### Exhibit 4: Upcoming events

Auctions				Economic Data		Federal Reserve	
	Date	NY Time	Event	NY Time	Event	NY Time	Event
Mon	7-Jan	11:30	USD39 Bln 3-Month Bills	10:00	Factory Orders	12:40	Fed's Bostic Speaks to Rotary Club of Atlanta
		11:30	USD36 Bln 6-Month Bills	10:00	Durable Goods Orders		
Tue	8-Jan	13:00	USD38 Bln 3-Year Notes				
Wed	9-Jan	13:00	USD24 Bln 10-Year Notes Reopening			8:20	Fed's Bostic Speaks in Chattanooga on Economic Outlook
						9:00	Fed's Evans Speaks on Economy and Monetary Policy
						11:30	Fed's Rosengren Speaks on the Economic Outlook
						14:00	FOMC Meeting Minutes
Thu	10-Jan	11:30	8-Week Bills			8:35	Fed's Barkin Speaks on Ensuring Long-Term Growth
		11:30	4-Week Bills			12:00	Fed's Powell to Speak to The Economic Club of Washington
		13:00	USD16 Bln 30-Year Bonds Reopening			12:40	Fed's Bullard Speaks on Economy and Monetary Policy
						13:00	Fed's Evans speaks at Economic Forecast Event
						17:30	Fed's Clarida Speaks to Money Marketeers in New York
Fri	11-Jan						
Mon	14-Jan	11:30	3-Month Bills				
		11:30	6-Month Bills				
Tue	15-Jan					13:00	Fed's George Speaks on Economy and Monetary Policy Outlook
Wed	16-Jan					14:00	U.S. Federal Reserve Releases Beige Book
						18:30	Fed's Kashkari Speaks on Panel About Financial Crisis
Thu	17-Jan	11:30	8-Week Bills				
		11:30	4-Week Bills				
		13:00	10-Year TIPS				
Fri	18-Jan						

Source: Morgan Stanley Research, Bloomberg

## Pivot Points

Pivot points are charting levels used by day traders to determine market direction, support, and resistance levels. We calculate daily pivot points using the previous day's open, high, low, and closing levels. We calculate weekly pivot points using the previous week's open, high, low, and closing levels.

**Exhibit 5:** US Treasury benchmark daily pivots, support, and resistance levels

	UST 2y	UST 3y	UST 5y	UST 7y	UST 10y	UST 30y
<b>Daily resistance 3</b>	2.581	2.579	2.608	2.658	2.762	3.062
<b>Daily resistance 2</b>	2.560	2.553	2.581	2.634	2.738	3.042
<b>Daily resistance 1</b>	2.534	2.523	2.549	2.604	2.710	3.021
<b>Daily pivot high</b>	2.467	2.444	2.467	2.529	2.640	2.964
<b>Daily pivot low</b>	2.456	2.431	2.454	2.517	2.628	2.954
<b>Daily Support 1</b>	2.434	2.405	2.427	2.493	2.604	2.934
<b>Daily Support 2</b>	2.408	2.374	2.395	2.463	2.577	2.913
<b>Daily Support 3</b>	2.379	2.339	2.358	2.430	2.545	2.887

Source: Morgan Stanley Research

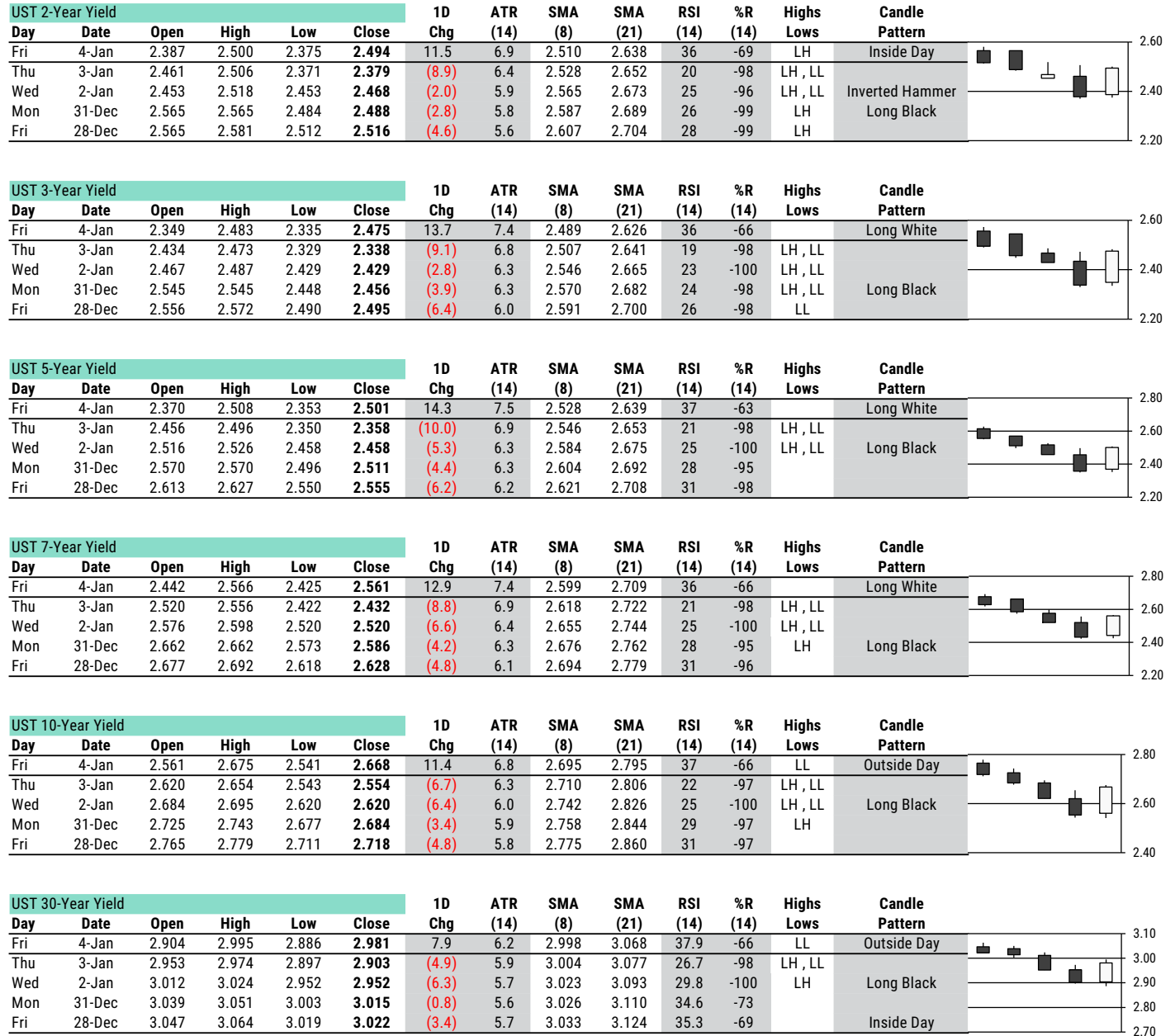
**Exhibit 6:** US Treasury futures daily pivots, support, and resistance levels

	TU1	FV1	TY1	UXY1	US1	WN1
<b>Daily resistance 3</b>	106-156	115-203	123-200	132-067	149-210	165-223
<b>Daily resistance 2</b>	106-123	115-115	123-06+	131-207	148-25+	164-153
<b>Daily resistance 1</b>	106-103	115-062	122-300	131-096	148-08+	163-232
<b>Daily pivot high</b>	106-070	114-293	122-16+	130-237	147-130	162-163
<b>Daily pivot low</b>	106-062	114-272	122-133	130-196	147-06+	162-062
<b>Daily Support 1</b>	106-035	114-205	122-028	130-057	146-17+	161-093
<b>Daily Support 2</b>	106-015	114-152	121-26+	129-266	146-00+	160-172
<b>Daily Support 3</b>	105-317	114-107	121-192	129-170	145-180	159-30+

Source: Morgan Stanley Research

# Technical Analysis

Exhibit 7: US Treasury cash



Source: Morgan Stanley Research, Bloomberg

Exhibit 8: UST Futures

TU Future						1D	ATR	SMA	SMA	RSI	%R	Highs	Candle	
Day	Date	Open	High	Low	Close	Chg	(14)	(8)	(21)	(14)	(14)	Lows	Pattern	
Fri	4-Jan	106-122	106-12+	106-036	<b>106-046</b>	-0-070	0-041	106-036	105-28+	63	-34		Long Black	
Thu	3-Jan	106-072	106-130	106-036	<b>106-116</b>	0-076	0-036	106-026	105-275	79	-5			
Wed	2-Jan	106-03+	106-06+	106-026	<b>106-040</b>	-0-010	0-032	106-006	105-263	72	-13			
Mon	31-Dec	105-300	106-042	105-300	<b>106-050</b>	0-022	0-032	105-318	105-25+	75	4			
Fri	28-Dec	105-300	106-042	105-300	<b>106-026</b>	0-012	0-030	105-308	105-245	73	-9		Outside Day	

FV Future						1D	ATR	SMA	SMA	RSI	%R	Highs	Candle	
Day	Date	Open	High	Low	Close	Chg	(14)	(8)	(21)	(14)	(14)	Lows	Pattern	
Fri	4-Jan	115-106	115-11+	114-20+	<b>114-242</b>	-0-17+	0-092	114-186	114-00+	67	-34		Long Black	
Thu	3-Jan	114-302	115-122	114-226	<b>115-096</b>	0-196	0-082	114-156	113-301	83	-4	HH		
Wed	2-Jan	114-172	114-290	114-170	<b>114-220</b>	0-000	0-071	114-102	113-266	77	-14	HH		
Mon	31-Dec	114-18+	114-186	114-18+	<b>114-220</b>	0-06+	0-066	114-076	113-242	77	8	HL		
Fri	28-Dec	114-166	114-170	114-156	<b>114-15+</b>	0-030	0-070	114-045	113-216	75	-4			

TY Future						1D	ATR	SMA	SMA	RSI	%R	Highs	Candle	
Day	Date	Open	High	Low	Close	Chg	(14)	(8)	(21)	(14)	(14)	Lows	Pattern	
Fri	4-Jan	123-050	123-07+	122-040	<b>122-060</b>	-0-310	0-177	121-285	121-076	64	-39		Long Black	
Thu	3-Jan	122-190	123-080	122-070	<b>123-050</b>	0-310	0-165	121-238	121-047	82	-3	HH, HL		
Wed	2-Jan	121-260	122-16+	121-260	<b>122-060</b>	0-05+	0-152	121-155	120-318	76	-16	HH, HL		
Mon	31-Dec	121-21+	122-040	121-180	<b>122-00+</b>	0-12+	0-145	121-11+	120-283	74	-6	HL		
Fri	28-Dec	121-12+	121-260	121-090	<b>121-200</b>	0-030	0-143	121-082	120-246	70	-14			

UXY Future						1D	ATR	SMA	SMA	RSI	%R	Highs	Candle	
Day	Date	Open	High	Low	Close	Chg	(14)	(8)	(21)	(14)	(14)	Lows	Pattern	
Fri	4-Jan	131-180	131-22+	130-07+	<b>130-09+</b>	-1-100	0-233	129-315	129-035	100	-41		Long Black	
Thu	3-Jan	130-29+	131-22+	130-150	<b>131-19+</b>	1-070	0-215	129-263	128-317	100	-3	HH, HL		
Wed	2-Jan	129-280	130-26+	129-250	<b>130-12+</b>	0-100	0-200	129-160	128-252	100	-17	HH, HL		
Mon	31-Dec	129-210	130-08+	129-15+	<b>130-02+</b>	0-150	0-188	129-107	128-200	100	-10	HL		
Fri	28-Dec	129-09+	129-270	129-04+	<b>129-19+</b>	0-02+	0-18+	129-065	128-148	100	-15			

US Future						1D	ATR	SMA	SMA	RSI	%R	Highs	Candle	
Day	Date	Open	High	Low	Close	Chg	(14)	(8)	(21)	(14)	(14)	Lows	Pattern	
Fri	4-Jan	148-160	148-270	146-190	<b>146-250</b>	-1-280	1-085	146-056	144-266	66	-37	HH	Outside Day	
Thu	3-Jan	147-180	148-250	146-290	<b>148-210</b>	1-290	1-061	145-297	144-206	83	-2	HH, HL		
Wed	2-Jan	145-230	147-140	145-190	<b>146-240</b>	0-240	1-041	145-14+	144-095	77	-16	HL		
Mon	31-Dec	145-210	146-090	145-070	<b>146-000</b>	0-150	1-023	145-075	144-002	74	-9	HL		
Fri	28-Dec	145-020	145-280	144-260	<b>145-170</b>	0-000	1-023	145-020	143-23+	72	-19			

WN Future						1D	ATR	SMA	SMA	RSI	%R	Highs	Candle	
Day	Date	Open	High	Low	Close	Chg	(14)	(8)	(21)	(14)	(14)	Lows	Pattern	
Fri	4-Jan	163-290	164-140	161-080	<b>161-270</b>	-2-070	1-226	161-062	159-210	64	-39	HH	Outside Day	
Thu	3-Jan	162-240	164-060	161-270	<b>164-020</b>	2-130	1-190	161-000	159-135	79	-2	HH, HL		
Wed	2-Jan	160-120	162-160	160-100	<b>161-210</b>	1-000	1-166	160-186	158-305	72	-17	HL		
Mon	31-Dec	160-100	161-060	159-240	<b>160-210</b>	0-190	1-151	160-151	158-178	68	-35			
Fri	28-Dec	159-250	160-210	159-120	<b>160-020</b>	-0-110	1-152	160-112	158-062	66	-47		Inside Day	

Source: Morgan Stanley Research, Bloomberg

## Holiday Trading Strategy

Combining the individual trading signals based on 10y Treasury future (TY) price patterns before and after US holidays has generated an annual strategy with no down years since 1987. See [Trading 10y Treasury Futures Around US Holidays](#) for more information.

Using historical data since 1983, we created a trading strategy using 10y Treasury futures (TY) that trades 11 times per year, either long or short, before or after the following US holidays: New Year's Day, Martin Luther King Day, Presidents' Day, Good Friday, Memorial Day, Independence Day, Labor Day, Columbus Day, Thanksgiving, and Christmas. [Exhibit 9](#) displays the trading rules:

**Exhibit 9:** Trading rules for US holiday trading model using US 10y futures contracts (TY)

Holiday	Day of Week	Direction	Before/After Holiday	Trading Rule (business days, 3pm NY unless specified)	Trade Entry (business days)	Trade Exit (business days)
New Year's Day	Rotates	Long TY	After	Buy TY New Years +1, Sell TY New Years +4	New Year + 1	New Year + 4
Martin Luther King Day 1	Monday	Long TY	Before	Buy TY Tuesday before MLK, Sell Friday before MLK	MLK - 4	MLK - 1
Martin Luther King Day 2	Monday	Short TY	After	Sell TY Tuesday after MLK, Buy Friday after MLK	MLK + 1	MLK + 4
President's Day	Monday	Long TY	After	Buy TY Tuesday after Pres. Day, Sell TY Friday after Pres. Day	Pres. Day + 1	Pres. Day + 4
Good Friday	Friday	Long TY	After	Buy TY Monday after Good Friday, Sell TY Friday after Good Friday	Good Friday + 1	Good Friday + 5
Memorial Day	Monday	Long TY	After	Buy TY Tuesday after Mem. Day, Sell TY Friday after Mem. Day	Mem. Day + 1	Mem. Day + 4
Independence Day (July 4th)	Rotates	Long TY	After	Buy TY Independence Day + 2, Sell TY Independence Day + 4	Ind. Day + 2	Ind. Day + 4
Labor Day	Monday	Long TY	Before	Buy TY Monday before Labor Day, Sell TY Thursday before Labor Day	Labor Day - 4	Labor Day - 2
Columbus Day	Monday	Short TY	Before	Sell TY Monday before Col. Day, Buy TY Thursday before Col. Day	Colum. Day - 5	Colum. Day - 2
Thanksgiving	Thursday	Long TY	Before	Buy TY Friday before Thanksgiving, Sell TY Tuesday before Thanksgiving	Thanksgiving - 4	Thanksgiving - 2
Christmas	Rotates	Short TY	Before	Sell TY Christmas Day - 4, Buy TY Christmas Day - 1	Christmas - 4	Christmas - 1

Source: Morgan Stanley Research

## G4 Smarter (beta) Trading Strategy

Enhancements to a G4 10y government bond futures momentum strategy have produced higher Sharpe ratios and stronger returns, relative to total return government bond indices for the G4, US, Germany, Japan, and the UK since 2000. See [A "Smarter" \(Beta\) Way to Trade G4 10y Futures Duration?](#) for more information on these strategies.

### Trading Strategy 1 – "Trade Longs/Fade Shorts"

When the 5-day moving average crosses above the 20-day moving average, buy the futures contract (long duration) and hold for a 25 business day period. When the 5-day moving average crosses below the 20-day moving average, buy the futures contract and hold for a 25 business day period. In short, this strategy buys futures when the Simple Moving Average Crossover (SMA) generates both a long and a short signal, given the historical outperformance of long signals traded long and underperformance of short signals traded short. Given that the SMA could generate both a long and a short signal within the predefined holding period, an investor may have a 200% long position since each of the two signals would be traded in separate portfolio sleeves.

### Trading Strategy 2 – Trade "Longs Only"

When the 5-day moving average crosses above the 20-day moving average, buy the futures contract (long duration) and hold for a 25 business day period. When the 5-day moving average crosses below the 20-day moving average, do nothing. In short, an investor ONLY trades long signals initiated by the SMA given their historical precedent to outperform.

**Exhibit 10: Trading Signals for G4 Smarter (beta) Trading Strategy**

Current Risk, G4 10y Futures	G4 Strategy Weight	Trade Longs Portfolio	Fade Shorts Portfolio	Total Risk Trade Longs Only	Total Risk Trade Longs/Fade Shorts (max 200%)	Trade Longs Portfolio Entry Date	Trade Longs Portfolio Exit Date	Fade Shorts Portfolio Entry Date	Fade Shorts Portfolio Exit Date
JB 10y Future	32.50%	0%	0%	0%	0%	N/A	N/A	N/A	N/A
GE 10y Future	29.25%	0%	0%	0%	0%	N/A	N/A	N/A	N/A
US 10y Future	30.50%	0%	0%	0%	0%	N/A	N/A	N/A	N/A
UK 10y Future	7.75%	100%	100%	100%	200%	1/4/2019	2/8/2019	12/27/2018	2/1/2019

Source: Morgan Stanley Research

## Market Data

Exhibit 11: US market data summary

US Treasuries					USD Swap and UST Benchmark Swap Spread				
Maturity	3PM YTM (%)	1d Δ (bp)	5PM YTM (%)	3~5PM Δ (bp)	Maturity	3PM YTM (%)	1d Δ (bp)	Spread (bp)	1d Δ (bp)
2y	2.486	9.8	2.494	0.8	2y	2.639	9.6	15.3	-0.2
3y	2.463	11.6	2.475	1.2	3y	2.566	11.2	10.3	-0.4
5y	2.482	11.5	2.501	1.8	5y	2.552	12.5	7.0	1.0
7y	2.547	11.2	2.561	1.4	7y	2.599	12.3	5.2	1.1
10y	2.658	10.4	2.668	1.0	10y	2.688	11.6	3.0	1.3
30y	2.974	7.3	2.981	0.7	30y	2.809	8.8	-16.5	1.5
UST curves	3PM Spread (bp)	1d Δ (bp)	5PM YTM (bp)	3 to 5PM Δ (bp)	Swap curves	3PM Spread (bp)	1d Δ (bp)	Spnd Curves (bp)	1d Δ (bp)
2s/3s	-2.3	1.8	-1.9	0.4	2s/3s	-7.2	1.6	-5.0	-0.2
3s/5s	1.9	-0.1	2.6	0.7	3s/5s	-1.4	1.3	-3.3	1.4
5s/7s	6.5	-0.3	6.0	-0.5	5s/7s	4.7	-0.2	-1.8	0.1
7s/10s	11.1	-0.8	10.7	-0.4	7s/10s	8.9	-0.7	-2.2	0.2
10s/30s	31.6	-3.1	31.3	-0.3	10s/30s	12.1	-2.8	-19.5	0.2
2s/3s/5s	-4.2	2.0	-4.5	-0.3	2s/3s/5s	-5.8	0.3	-1.6	-1.6
2s/5s/10s	-17.9	2.8	-16.0	1.9	2s/5s/10s	-22.2	3.7	-4.3	0.9
5s/7s/10s	-4.6	0.6	-4.7	-0.1	5s/7s/10s	-4.1	0.5	0.4	0.0
5s/10s/30s	-14.1	2.0	-14.6	-0.6	5s/10s/30s	1.5	2.0	15.5	0.0
UST Futures							US TIPS - Real Yields		
Front Contract	3PM Close (32nds)	1d Δ (32nds)	Agg Volume	Vol 1d Δ	Vol 60d Z	OI 1w Δ	Maturity	Real Yield (%)	1d Δ (bp)
TU	106-046	-0-070	723,941	31,580	0.13	-28,204	TII 7/20	1.78	-0.8
FV	114-242	-0-17+	1,263,497	-514,872	-0.08	-10,029	TII 4/23	0.91	4.2
TY	122-060	-0-310	1,883,282	-755,216	-0.16	148,502	TII 7/28	0.90	3.3
UXY	130-09+	-1-100	187,062	-84,179	-0.20	37,304	TII 2/48	1.17	3.7
US	146-250	-1-280	361,406	-118,506	-0.31	9,498			
WN	164-020	-2-070	131,663	-54,293	-0.48	-2,549			
GCF Repo			Eurodollar Futures			Forward Swap Rates			
Maturity	O/N (%)	1d Δ (bp)	Pack	Rate (%)	1d Δ (bp)	Maturity	Rate (%)	1d Δ (bp)	
GCF O/N	2.49	-15.1	Whites	2.66	8.5	1y1y	2.53	12.6	
GCF Feb19	2.44		Reds	2.45	13.0	1y2y	2.47	13.6	
GCF Mar19	2.46		Greens	2.42	14.5	2y2y	2.45	14.7	
GCF Apr19	2.44		Blues	2.51	15.0	2y5y	2.58	13.5	
GCF May19	2.44		Gold	2.64	13.7	3y2y	2.53	14.5	
GCF Jun19	2.46					3y5y	2.67	12.7	
GCF Jul19	2.46					3y10y	2.82	10.9	
GCF Aug19	2.44					5y5y	2.84	10.8	
FOMC Meeting Pricing			LIBOR Settings			Ginnie/Fannie Swaps			
Meetings	Rate (bp)	Prob, 1d Δ (%)	Tenor	Rate (%)	1d Δ (bp)	Swap	Spread (32nds)	1d Δ (32nds)	
FF Effective	2.40		O/N	2.394	0.2	GN/FN 3.0	1-02+	0-046	
1/30/2019	2.40	0, 4	1m	2.521	0.8	GN/FN 3.5	0-230	0-042	
3/20/2019	2.40	-2, 10	3m	2.804	0.9	GN/FN 4.0	0-15+	0-042	
5/1/2019	2.40	1, 22	6m	2.856	-0.3	GN/FN 4.5	-0-00+	0-03+	
6/19/2019	2.41	3, 27	12m	2.965	-4.0				
7/31/2019	2.39	-2, 33							
9/18/2019	2.39	-5, 39							
Other Market Data									
Index/Security	Close	1d Δ							
S&P 500	2,531.94	3.43%							
USD/JPY	108.51	0.77%							
EUR/USD	1.1395	0.01%							
10y Bund	0.21%	5.5 bp							
10y Gilt	1.28%	8.2 bp							
20y JGB	0.46%	-4.6 bp							
Gold	1285.15	-0.71%							
VIX	21.38	-15.99%							

Source: Morgan Stanley Research, Bloomberg

## In Case You Missed It

### [US Interest Rate Strategy: UST Spreads into Year-End](#)

14 Dec 2018

Net Primary Dealer UST holdings reached a record high, according to the Fed's latest data release. As a result, we turn tactically neutral on swap spreads given dealer balance sheet constraints into year-end. We remain bullish on March 2019 FRAOIS given seasonality in CP issuance and MMF flows.

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

14 Dec 2018

Modest inflation, a hawkish Fed, falling oil prices, and poor carry have driven a capitulation in TIPS, mirrored in JGBi breakevens. A dovish FOMC tilt, and the 2014/15 precedent suggests some relief for breakevens. We take off our beta-weighted 10y TIPS breakeven short, & turn neutral on TIPS.

### [US Economics & Rates Strategy: FOMC Preview: All Options on the Table Next Year](#)

13 Dec 2018

The Fed hikes in December and signals flexibility in the path ahead. A shift lower in the dots will underscore that the ultimate destination next year is unknown. Should the median remain at three hikes in 2019, our strategists expect UST 2s5s and 2s10s curves to flatten further.

### [Global Interest Rate Strategist: Yield Compression Has Begun](#)

8 Dec 2018

The US and Canada shot birdies on the first hole of the Ryder Cup of Bonds. Europe plays next with the ECB ready to tee off. Financial conditions continue to tighten despite an increasingly self-proclaimed data-dependent Fed. Real yields need to fall further before détente with financial conditions.

### [2019 Rates Outlook: The Ryder Cup of Bonds](#)

1 Dec 2018

Overweight US Treasuries, underweight German Bunds and UK gilts, neutral on JGBs. We forecast curves to flatten in the US (2s5s and 2s10s), the UK (5s30s), Germany (2s30s), and Japan (20s40s). Top trades: Long TY and CN futures vs. short RX and G futures, short 2y German Schatz, short 5y gilts.

### [2019 US Economic Outlook: Managing Neutral](#)

25 Nov 2018

In 2019, the Fed manages policy around neutral as higher interest rates and trade bite. A record-high tax refund season front-loads consumer spending, investment remains modest, net trade and housing exert a drag. In 2020, growth re-accelerates and inflation moves higher, pushing the Fed to do more.



## Disclosure Section

The information and opinions in Morgan Stanley Research were prepared by Morgan Stanley & Co. LLC, and/or Morgan Stanley C.T.V.M. S.A., and/or Morgan Stanley Mexico, Casa de Bolsa, S.A. de C.V., and/or Morgan Stanley Canada Limited. As used in this disclosure section, "Morgan Stanley" includes Morgan Stanley & Co. LLC, Morgan Stanley C.T.V.M. S.A., Morgan Stanley Mexico, Casa de Bolsa, S.A. de C.V., Morgan Stanley Canada Limited and their affiliates as necessary.

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](http://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: Guneet Dhingra, CFA; Sam Elprince; David Harris; Matthew Hombach; Tony Small.

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/conflictolicies](http://www.morganstanley.com/institutional/research/conflictolicies). A Portuguese version of the policy can be found at [www.morganstanley.com.br](http://www.morganstanley.com.br)

### Important US Regulatory Disclosures on Subject Companies

Within the last 12 months, Morgan Stanley managed or co-managed a public offering (or 144A offering) of securities of United Kingdom, United States of America.

In the next 3 months, Morgan Stanley expects to receive or intends to seek compensation for investment banking services from Germany, Japan, United Kingdom, United States of America.

Within the last 12 months, Morgan Stanley has received compensation for products and services other than investment banking services from Germany.

Within the last 12 months, Morgan Stanley has provided or is providing investment banking services to, or has an investment banking client relationship with, the following company: Germany, Japan, United Kingdom, United States of America.

Within the last 12 months, Morgan Stanley has either provided or is providing non-investment banking, securities-related services to and/or in the past has entered into an agreement to provide services or has a client relationship with the following company: Germany.

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%
<b>TOTAL</b>	<b>3,183</b>		<b>710</b>			<b>1429</b>	

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). The stock's total return is expected to exceed 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). The stock's total return is expected to be in line with 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 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). The stock's total return is expected to be below 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](http://www.morganstanley.com/online/researchdisclosures). For Morgan Stanley specific disclosures, you may refer to [www.morganstanley.com/researchdisclosures](http://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 & Co. International PLC and its affiliates have a significant financial interest in the debt securities of Germany, Japan, United Kingdom.

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](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](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.

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 (QFCRA), 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