

GOAL Kickstart

Reflation continuation in December but 2021 starts 'risk off'

Despite recording the worst drop in economic activity since the World Wars, 2020 was a very positive year for financial markets. World GDP plunged by about 20% in mid-April but at the same time global fiscal spending increased at an unprecedented pace led by the US fiscal stimulus of more than \$3tn while central banks in developed markets expanded their balance sheet to more than 50% of GDP, supporting a recovery in most assets. The Georgia runoff will be an important catalyst for the 2021 US fiscal outlook.

2021 has started 'risk off' today in the US session. Risky assets performed well into year-end, despite a very strong November, signs of worsening activity and further lockdown measures in several countries. US small caps rallied more than 8% in December closely followed by EM equities, oil and Nasdaq, while the Dollar continued to depreciate (Exhibit 1). Gold performed strongly and closed its gap to real rates. Bitcoin surged 50%. Despite the positive environment, not all growth sensitive assets performed well – while Russell, breakeven inflation and major USD crosses outperformed, copper vs gold and cyclical vs defensives moved sideways (Exhibit 2).

The friendly December markets backdrop has been supported by a positive growth/rates mix and a low level of

volatility. Despite a small increase in long term rates in December, in line with most of 2020, real rates restored their downward trend as breakeven inflation broke the 2% level (Exhibit 3). US 10y real rates fell again below -1%. This regime has been very supportive for risky assets and, in line with the historical pattern, Gold performed well alongside equities. Moreover, the low level of risky assets volatility has likely supported investors' risk appetite. In December S&P 500 realised volatility was only a touch above 8% (Exhibit 4). However, equity implied volatility has stayed elevated with an upward sloping VIX futures curve at around 25%. The current gap between the VIX and last month realised volatility is in the top 1st percentile since 1990 (14pp gap).

Despite the large re-risking since November, the continued elevated implied volatility indicates lingering concerns among investors. While we think a low volatility regime is unlikely to materialize, in part due to longer equity duration and high valuations, eventually we do see room for declines in implied volatility in 2021, in particular after today's move. As a result selective short volatility strategies can be appealing, especially relative to long credit exposure where spreads are already very tight.

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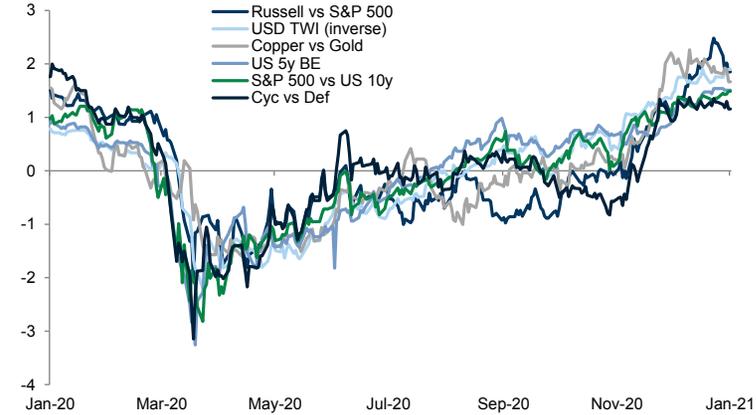
Reflation continuation in December but 2021 starts 'risk off'

Exhibit 1: US small caps and EM equities outperformed in December, while the Dollar depreciated



Source: Datastream, Goldman Sachs Global Investment Research

Exhibit 2: Among growth sensitive assets, Russell, Breakeven inflation and USD crosses have outperformed
z-score last 12m



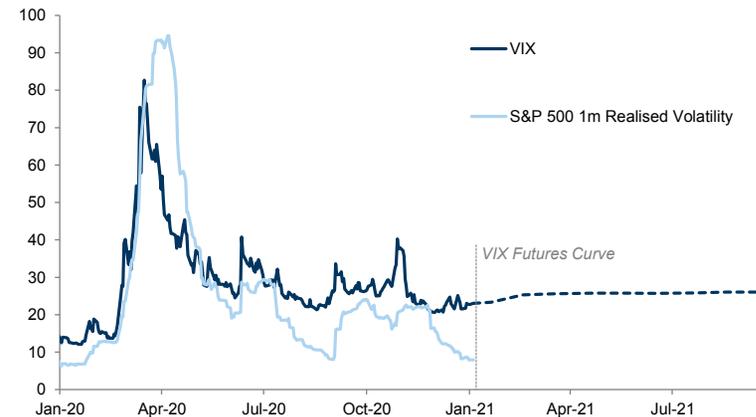
Source: Datastream, Goldman Sachs Global Investment Research

Exhibit 3: US breakeven inflation continued to increase while real rates declined



Source: Bloomberg, Goldman Sachs Global Investment Research

Exhibit 4: Implied volatility remains elevated despite the low level of realised volatility



Source: Datastream, Bloomberg, Goldman Sachs Global Investment Research

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Cross-asset: Forecasts

Exhibit 5: GOAL asset allocation recommendations and GS cross-asset forecasts

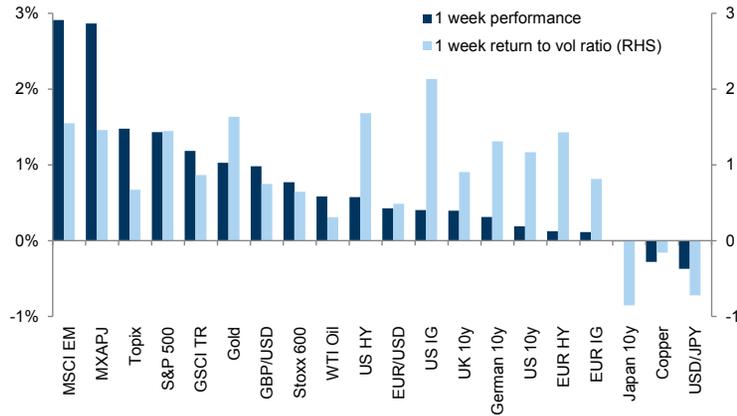
	Allocation Weighting		Current Level	Forecasts			Forecast Upside/Downside (%)		
	3m	12m		3m	6m	12 m	3m	6m	12 m
Equities	OW	OW			Index level			Total Return	
S&P 500 (\$)	N	N	3756	3900	4100	4300	4.2	9.9	16.1
Stoxx Europe 600 (€)	OW	N	399	405	420	430	2.2	6.8	10.8
MSCI Asia-Pacific Ex-Japan (\$)	OW	N	662	650	675	700	-1.3	2.7	7.3
Topix (¥)	OW	N	1805	1750	1800	1875	-2.5	0.8	6.0
10 Year Government Bonds	UW	UW			Yield (%)			Total Return	
US	OW	UW	0.91	0.86	1.01	1.31	1.7	0.4	-1.9
Germany	N	N	-0.58	-0.55	-0.50	-0.39	0.1	-0.6	-1.9
Japan	N	N	0.02	0.00	0.05	0.10	0.6	0.1	-0.4
UK	-	-	0.20	0.21	0.31	0.51	0.5	-0.4	-2.3
Corporate Bonds	N	N			Spread			Total Return	
Bloomberg Barclays US IG	UW	N	96	103	101	100	1.5	1.2	0.4
Bloomberg Barclays US HY	OW	N	358	369	350	340	0.4	1.1	2.3
iBoxx EUR IG	N	N	101	100	97	96	0.5	0.8	1.0
BAML EUR HY	OW	N	355	364	340	330	0.1	1.8	3.1
JP Morgan EMBI Div.	OW	OW	352	345	338	325	2.9	3.4	4.5
Commodities	N	OW			Spot price			Spot Return	
WTI (\$/bbl)	-	-	48	45	49	60.5	-6.8	1.5	25.3
Brent (\$/bbl)	-	-	52	47	51	63	-9.4	-1.7	21.4
Copper (\$/mt)	-	-	7749	8200	8700	9500	5.8	12.3	22.6
Gold (\$/troy oz)	-	-	1898	2300	2300	2300	21.2	21.2	21.2
FX	-	-			Spot rate			Spot Return	
EUR/USD	-	-	1.22	1.25	1.27	1.28	2.2	3.8	4.6
USD/JPY	-	-	103.25	103.00	102.00	100.00	-0.2	-1.2	-3.1
GBP/USD	-	-	1.37	1.42	1.44	1.45	3.9	5.3	6.1
USD/BRL	-	-	5.19	5.00	4.90	4.70	-3.7	-5.7	-9.5
USD/RUB	-	-	73.96	71.00	70.00	68.00	-4.0	-5.4	-8.1
USD/INR	-	-	73.07	72.00	71.00	70.00	-1.5	-2.8	-4.2
USD/CNY	-	-	6.54	6.40	6.30	6.20	-2.1	-3.7	-5.2
Cash	N	N			Spot rate			Total Return	
US 3-month rate	-	-	0.24	-	-	-	0.06	0.16	0.31
Euro area 3-month rate	-	-	-0.57	-	-	-	-0.14	-0.27	-0.52

Source: Bloomberg, Datastream, iBoxx, Yieldbook Citi, Goldman Sachs Global Investment Research.

Cross-asset: Weekly and YTD performance, absolute and risk-adjusted

Exhibit 6: Local currency total returns and return to vol ratios over the past week

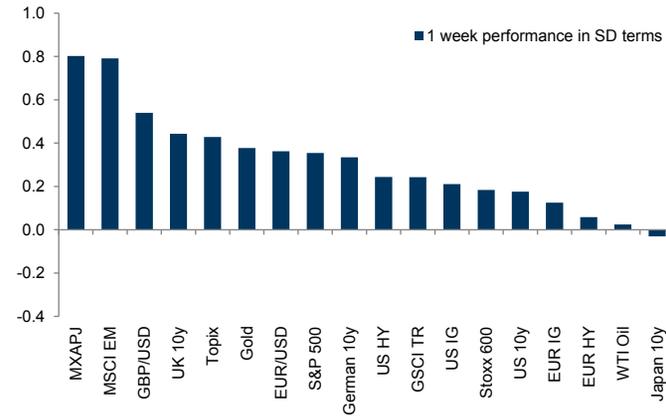
Weekly returns, return to vol ratios based on weekly volatility



Source: Datastream, iBoxx, Goldman Sachs Global Investment Research

Exhibit 7: Local currency total returns in standard deviation terms

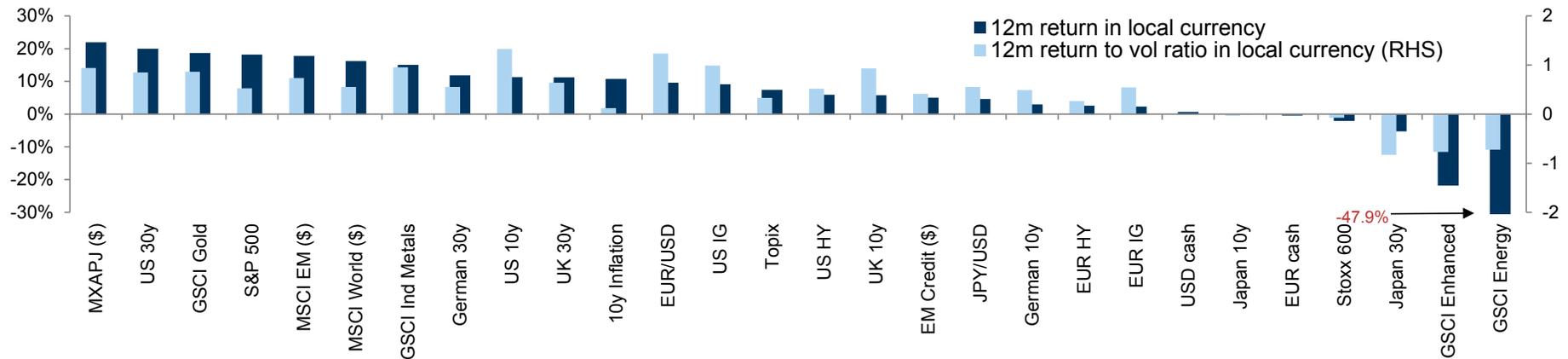
1-week performance in rolling 12m standard deviation terms



Source: Datastream, iBoxx, Goldman Sachs Global Investment Research

Exhibit 8: Local currency returns and return to vol ratios

12-month returns



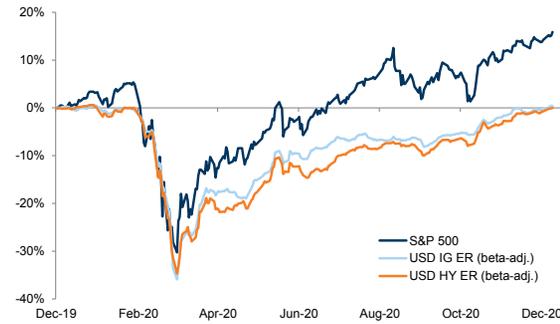
Source: Datastream, iBoxx, Goldman Sachs Global Investment Research

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Cross-asset: Equity vs. credit monitor

Exhibit 9: USD cash credit vs. US equity

Cash credit excess returns (beta-adjusted) vs. S&P 500 total returns



Source: Datastream, Goldman Sachs Global Investment Research

Exhibit 10: USD synthetic credit vs. US equity

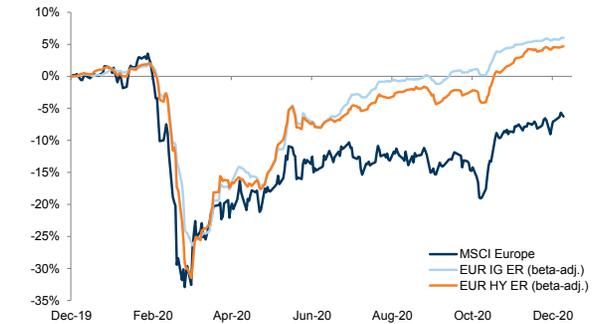
Synthetic credit excess returns (beta-adjusted) vs. S&P 500 total returns



Source: Datastream, Goldman Sachs Global Investment Research

Exhibit 11: EUR cash credit vs. European equity

Cash credit excess returns (beta-adjusted) vs. MSCI Europe total returns



Source: Datastream, Goldman Sachs Global Investment Research

Exhibit 12: EUR synthetic credit vs. European equity

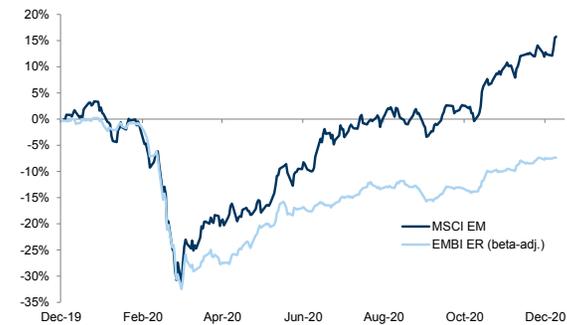
Synthetic credit excess returns (beta-adjusted) vs. MSCI Europe total returns



Source: Datastream, Goldman Sachs Global Investment Research

Exhibit 13: EM cash credit vs. EM equity

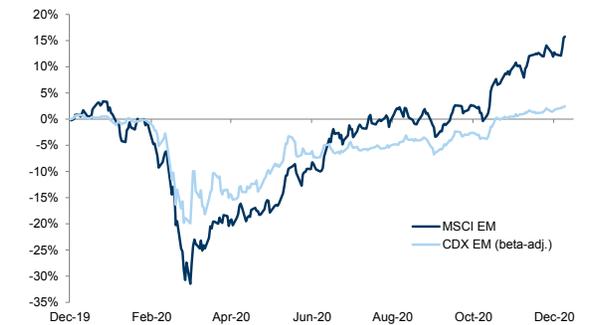
Cash credit excess returns (beta-adjusted) vs. MSCI EM total returns



Source: Datastream, Goldman Sachs Global Investment Research

Exhibit 14: EM synthetic credit vs. EM equity

Synthetic credit excess returns (beta-adjusted) vs. MSCI EM total returns



Source: Datastream, Goldman Sachs Global Investment Research

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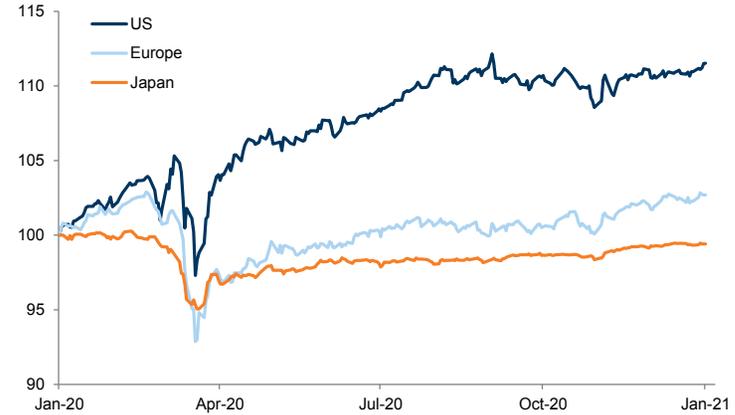
Cross-asset: Balanced portfolios and dynamic allocation strategies performance

Exhibit 15: 60/40 equity/bond portfolio performance across regions last 12m
Relative total return performance indexed to 100 12m ago (data since 2010)



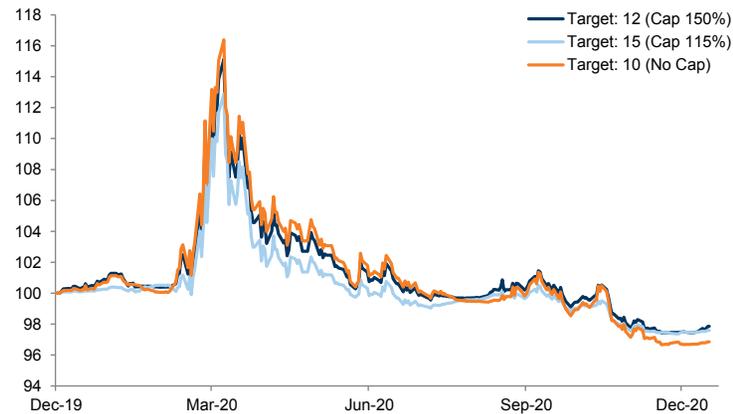
Source: Datastream, Goldman Sachs Global Investment Research

Exhibit 16: Risk parity portfolio performance across regions last 12m
Weighted inversely by 3m realised volatility of equity and 10y bonds



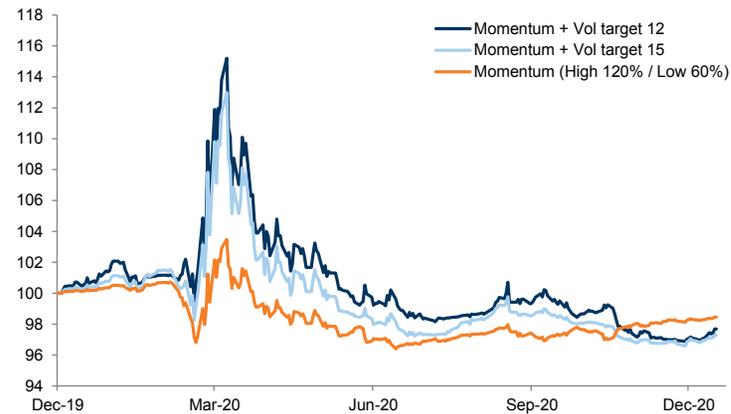
Source: Datastream, Goldman Sachs Global Investment Research

Exhibit 17: 60/40 portfolio with volatility target strategies overlay vs. US 60/40 portfolio
60% S&P 500, 40% US 10y bond; based on 1m realised S&P 500 volatility



Source: Datastream, Goldman Sachs Global Investment Research

Exhibit 18: 60/40 portfolio with volatility target strategies and momentum overlay vs. US 60/40
60% S&P 500, 40% US 10y bond; Strategy methodology see: GOAL: The Balanced Bear - Part 2



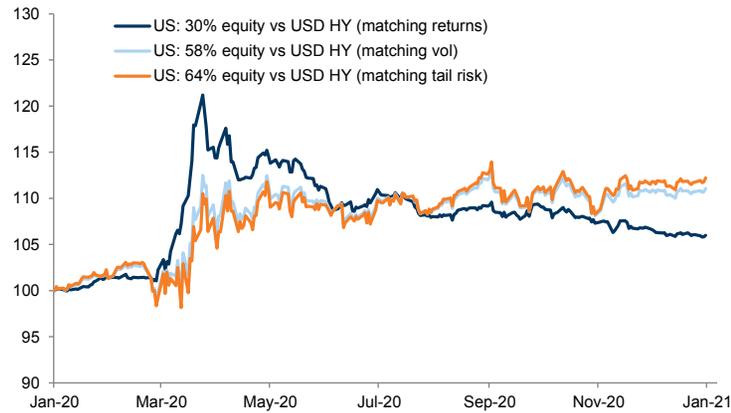
Source: Datastream, Goldman Sachs Global Investment Research

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Cross-asset: Multi-asset portfolios to replicate credit

Exhibit 19: Multi-asset portfolios replicating USD HY credit

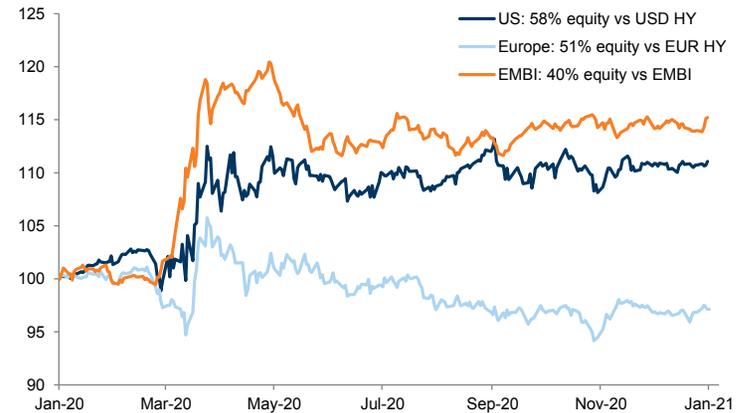
Relative performance indexed at 100 12m ago (data since 2010) - Strategy methodology see: Global Strategy Paper: When to give credit to equity or carry on



Source: Datastream, Haver Analytics, Goldman Sachs Global Investment Research

Exhibit 20: Multi-asset portfolios based on credit volatility

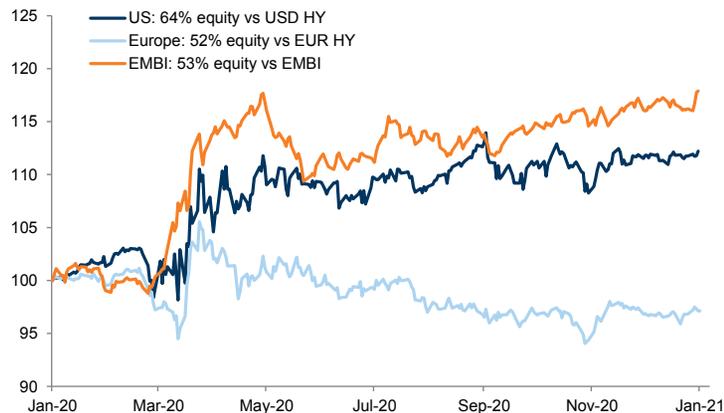
Relative performance indexed at 100 12m ago (data since 2010) - Strategy methodology see: Global Strategy Paper: When to give credit to equity or carry on



Source: Datastream, Haver Analytics, Goldman Sachs Global Investment Research

Exhibit 21: Multi-asset portfolios based on credit tail risk

Relative performance indexed at 100 12m ago (data since 2010)- Strategy methodology see: Global Strategy Paper: When to give credit to equity or carry on



Source: Datastream, Haver Analytics, Goldman Sachs Global Investment Research

Exhibit 22: Multi-asset portfolios based on credit tail risk

Relative performance indexed at 100 12m ago (data since 2010)- Strategy methodology see: Global Strategy Paper: When to give credit to equity or carry on



Source: Datastream, Bloomberg, Haver Analytics, Goldman Sachs Global Investment Research

Cross-asset: Correlation matrix

Exhibit 23: Cross-asset correlation matrix

Upper half of matrix: current 1-year correlation (black shading = more/less than 0.50/-0.50); lower half of matrix: percentile since 2001 (dark grey shading indicates above 75th percentile, orange shading indicates below 25th percentile); correlations are calculated on weekly, local currency returns.

	S&P 500	STOXX 600	MXAPJ	TOPIX	MSCI EM	US 10 yr	Germany 10 yr	Japan 10 yr	UK 10 yr	EUR/USD	USD/JPY	AUD/USD	iBoxx US IG	iBoxx EUR IG	BAML US HY	BAML EUR HY	EM Credit (\$)	WTI Crude Oil	Copper	Gold	VIX
Current 1y correlation of weekly returns																					
S&P 500		0.78	0.87	0.66	0.86	-0.28	-0.02	0.18	0.00	0.54	-0.18	0.81	0.70	0.68	0.89	0.85	0.74	0.18	0.62	0.47	-0.65
STOXX 600	0.28		0.80	0.82	0.82	-0.29	-0.20	0.15	-0.07	0.38	0.05	0.77	0.51	0.54	0.70	0.74	0.61	0.32	0.43	0.39	-0.71
MXAPJ	1.00	0.88		0.63	0.99	-0.27	0.02	0.19	0.01	0.60	-0.22	0.87	0.66	0.72	0.85	0.84	0.75	0.27	0.72	0.44	-0.59
TOPIX	0.84	0.97	0.54		0.64	-0.24	-0.12	0.14	0.03	0.41	0.00	0.66	0.46	0.36	0.60	0.60	0.46	-0.03	0.23	0.38	-0.49
MSCI EM	0.99	0.87	1.00	0.65		-0.29	0.01	0.20	0.01	0.62	-0.22	0.88	0.65	0.72	0.84	0.84	0.75	0.30	0.71	0.45	-0.59
US 10 yr	0.64	0.68	0.38	0.70	0.42		0.68	0.58	0.77	0.10	-0.56	-0.14	0.32	0.01	-0.12	-0.10	0.04	-0.09	-0.29	0.35	0.42
Germany 10 yr	0.89	0.63	0.87	0.85	0.86	0.02		0.71	0.79	0.25	-0.70	0.02	0.52	0.45	0.23	0.22	0.38	-0.17	0.00	0.32	0.42
Japan 10 yr	0.99	0.97	0.97	0.97	0.98	0.81	0.94		0.64	0.36	-0.64	0.24	0.74	0.56	0.43	0.50	0.59	0.07	0.11	0.49	0.26
UK 10 yr	0.93	0.93	0.91	1.00	0.91	0.48	0.23	0.90		0.25	-0.58	0.11	0.52	0.30	0.19	0.18	0.33	-0.07	-0.05	0.42	0.29
EUR/USD	0.98	0.92	0.99	0.91	0.99	0.38	0.79	0.96	0.76		-0.53	0.74	0.60	0.52	0.65	0.60	0.52	-0.05	0.40	0.52	-0.07
USD/JPY	0.08	0.13	0.18	0.18	0.17	0.39	0.05	0.00	0.11	0.26		-0.34	-0.59	-0.42	-0.38	-0.33	-0.42	0.09	-0.21	-0.48	-0.28
AUD/USD	0.96	0.95	0.96	0.92	0.99	0.35	0.67	0.91	0.80	0.98	0.35		0.68	0.66	0.83	0.80	0.69	0.16	0.59	0.56	-0.48
iBoxx US IG	0.97	0.99	0.99	0.99	1.00	0.00	0.13	0.99	0.15	0.96	0.08	0.97		0.82	0.86	0.87	0.86	0.13	0.46	0.63	-0.17
iBoxx EUR IG	0.96	0.99	0.99	0.95	1.00	0.01	0.16	0.95	0.12	0.93	0.16	0.98	0.81		0.86	0.91	0.89	0.27	0.57	0.36	-0.25
BAML US HY	0.96	0.84	0.99	0.82	0.99	0.49	0.83	1.00	0.86	1.00	0.03	0.98	0.99	0.98		0.96	0.90	0.21	0.66	0.51	-0.41
BAML EUR HY	0.96	0.97	0.98	0.78	0.99	0.64	0.92	1.00	0.93	1.00	0.04	0.98	0.99	0.99	0.97		0.92	0.29	0.63	0.47	-0.44
EM Credit (\$)	0.94	0.94	0.95	0.89	0.95	0.34	0.81	1.00	0.74	0.97	0.06	0.94	0.98	0.94	0.94	0.96		0.41	0.61	0.50	-0.32
WTI Crude Oil	0.44	0.65	0.56	0.16	0.54	0.56	0.41	0.91	0.61	0.07	0.62	0.35	0.82	0.98	0.45	0.75	0.89		0.29	-0.04	-0.38
Copper	0.93	0.63	0.92	0.44	0.92	0.35	0.91	0.91	0.84	0.79	0.09	0.83	0.99	0.99	0.98	0.99	0.98	0.54		0.22	-0.40
Gold	0.96	0.94	0.83	0.96	0.81	0.72	0.78	0.94	0.86	0.68	0.37	0.74	0.93	0.80	0.97	0.96	0.89	0.14	0.48		-0.23
VIX	0.90	0.55	0.36	0.51	0.43	0.67	0.72	0.83	0.51	0.41	0.55	0.21	0.11	0.09	0.49	0.39	0.35	0.21	0.27	0.07	
Current correlation's percentile since 2001																					

Source: Datastream, iBoxx, Goldman Sachs Global Investment Research

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Cross-asset: Valuation and risk premia

Exhibit 24: Cross-asset valuation table

A higher percentile means more expensive relative to 10y history

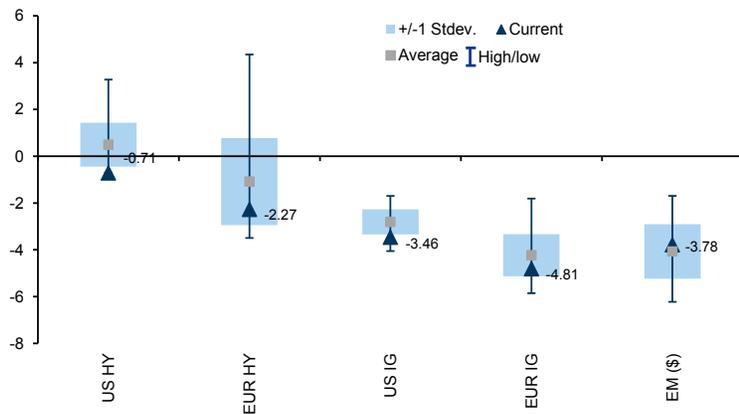
Valuation metric	S&P 500					Government bonds				Credit					FX	
	Stoxx 600	MXAPJ	Topix	MSCI EM	US 10y	German 10y	Japan 10y	UK 10y	US IG	US HY	EUR IG	EUR HY	EM (\$)	EUR/USD	USD/JPY	
12m forward P/E ratio	22.8x	17.6x	16.9x	17.8x	15.4x	GS fair value yield - Actual yield				Spread					Actual - GS fair value	
Current:	22.8x	17.6x	16.9x	17.8x	15.4x	88bp	111bp	37bp	128bp	110bp	386bp	101bp	355bp	352bp	-0.08 €//\$	7.3 \$/¥
Expensiveness (last 10y percentile):	100%	98%	100%	99%	100%	90%	87%	53%	88%	99%	77%	96%	76%	38%	56%	61%
3M change:	1.6x	0.8x	1.5x	0.9x	1.2x	-22bp	1bp	-1bp	6bp	-43bp	-152bp	-27bp	-111bp	-79bp	0.05 €//\$	-2.2 \$/¥
Average:	15.9x	13.6x	12.5x	13.6x	11.3x	24bp	23bp	20bp	26bp	156bp	492bp	150bp	468bp	344bp	-0.05 €//\$	5.6 \$/¥
95th:	21.6x	17.0x	15.4x	16.6x	14.2x	104bp	128bp	66bp	143bp	224bp	750bp	272bp	850bp	453bp	0.17 €//\$	22.9 \$/¥
5th:	11.9x	9.7x	10.5x	11.3x	9.4x	-69bp	-124bp	-40bp	-118bp	116bp	347bp	101bp	279bp	268bp	-0.21 €//\$	-22.0 \$/¥

Note: Sudoku is our fair value macro model for bond yields; GSDEER is our fair value macro model for exchange rates. US IG spread is from iBoxx. EM (\$) is JPM EMBI.

Source: Datastream, I/B/E/S, iBoxx, Goldman Sachs Global Investment Research

Exhibit 25: Credit spread minus equity risk premium estimates across markets

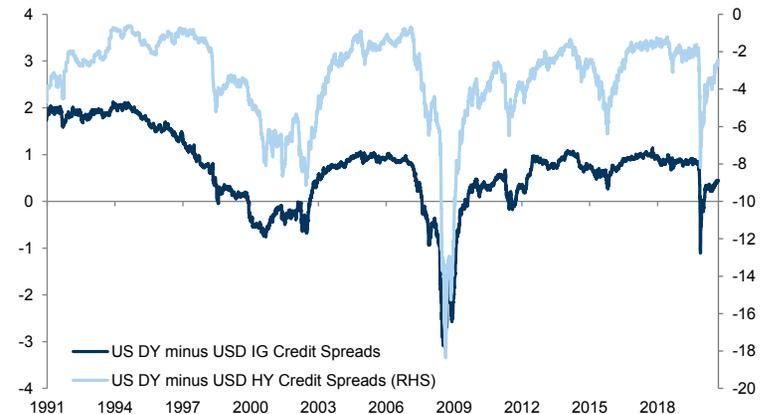
Equity risk premia based on 1-stage DDM using local 10-year yields and LT GDP consensus estimates. Using past 10 years of data.



Source: Datastream, iBoxx, Goldman Sachs Global Investment Research

Exhibit 26: Equity vs. credit relative valuation

US Dividend Yield minus Credit spreads

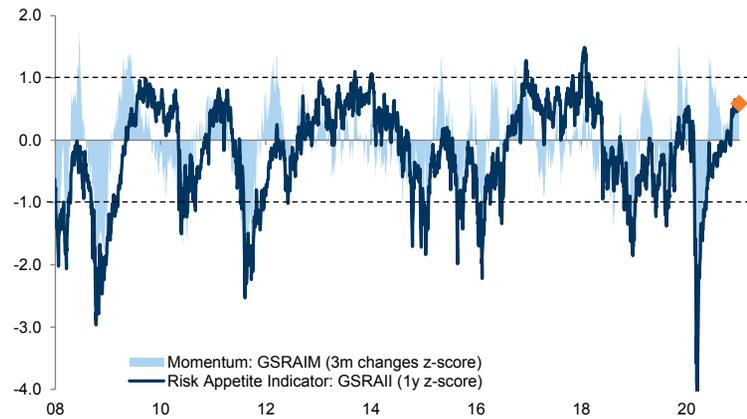


Source: Datastream, Goldman Sachs Global Investment Research

Cross-asset: Risk appetite indicator

Exhibit 27: Risk appetite indicator level and momentum factors

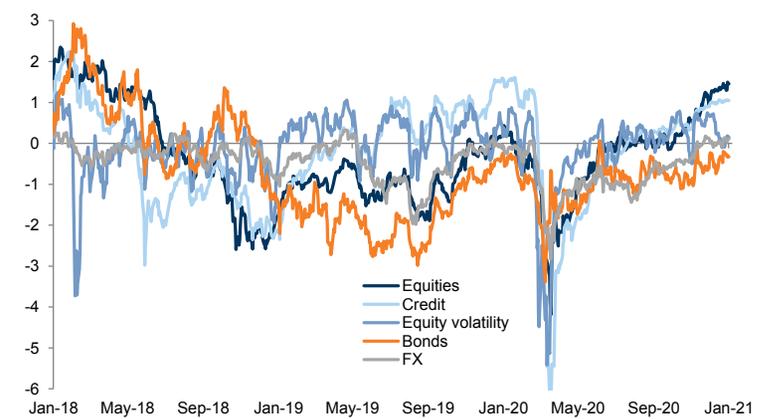
See July 2016 GOAL for construction details



Source: Goldman Sachs Global Investment Research

Exhibit 28: Risk appetite indicators for different asset classes

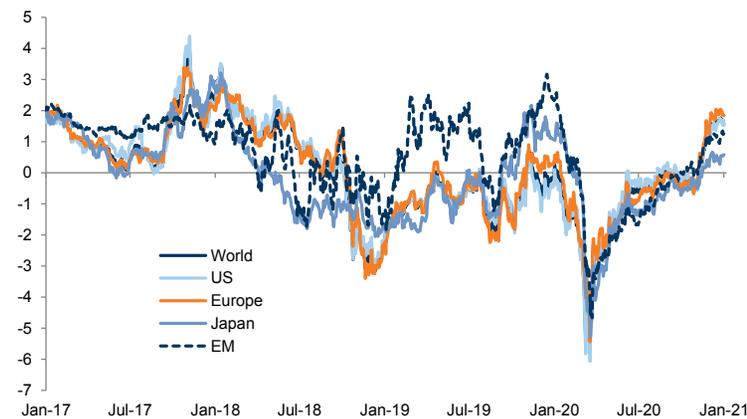
See July 2016 GOAL for construction details



Source: Goldman Sachs Global Investment Research

Exhibit 29: Cyclical vs. defensives 1-year rolling z-score across regions

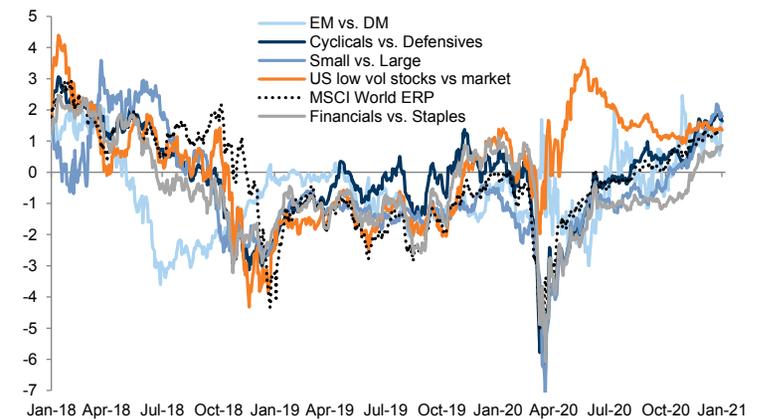
See July 2016 GOAL for construction details



Source: Goldman Sachs Global Investment Research

Exhibit 30: Sub-components of equity risk appetite indicator

See July 2016 GOAL for construction details



Source: Goldman Sachs Global Investment Research

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GS Risk Appetite Indicator: Principal component analysis

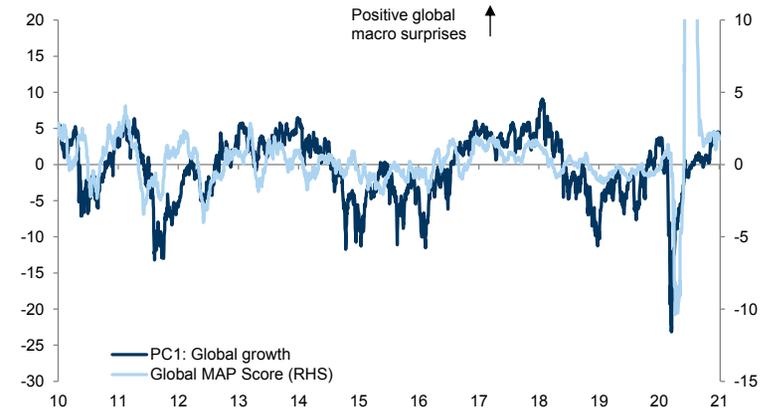
Exhibit 31: GS RAI principal component

See April 2019 GOAL for construction details



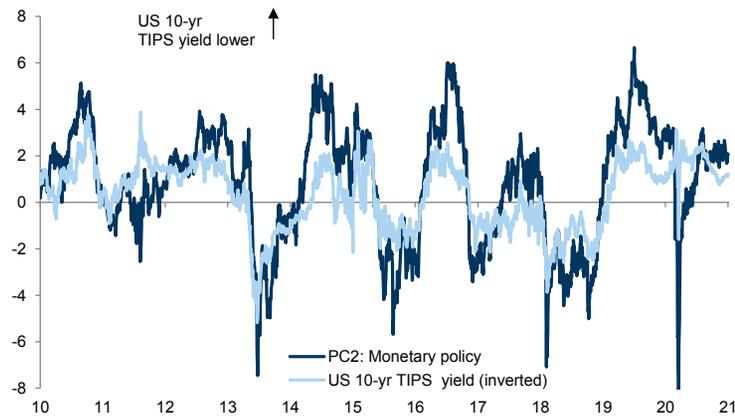
Source: Datastream, Goldman Sachs Global Investment Research

Exhibit 32: PC1: Global growth factor vs. Global CAI innovations



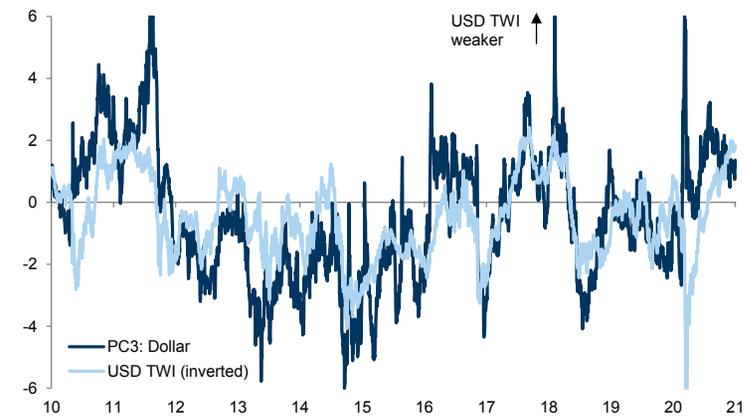
Source: Datastream, Goldman Sachs Global Investment Research

Exhibit 33: PC2: Monetary policy factor vs. US 10-year TIPS yield



Source: Datastream, Goldman Sachs Global Investment Research

Exhibit 34: PC3: Dollar factor vs. USD TWI



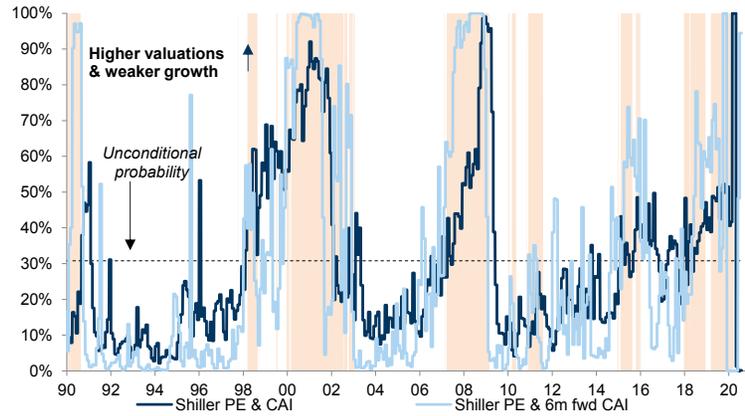
Source: Datastream, Goldman Sachs Global Investment Research

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GS Tail Risk Models: Valuations, growth and sentiment

Exhibit 35: Probability of a 10% S&P 500 drawdown in the next 12m based on current valuations and CAI levels

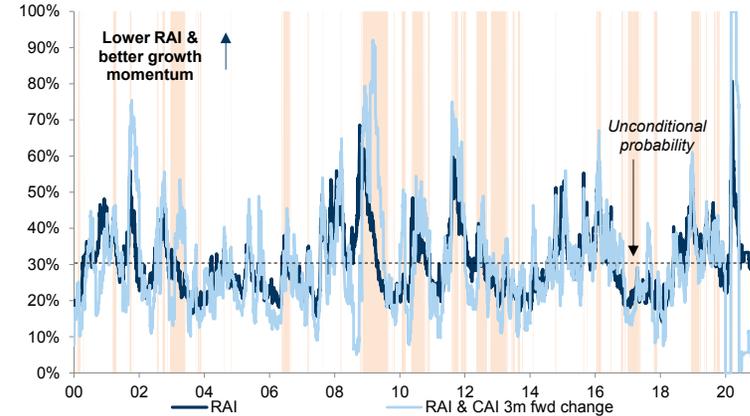
Orange shading: 20% drawdown in the next 12m



Source: Haver Analytics, Datastream, Goldman Sachs Global Investment Research

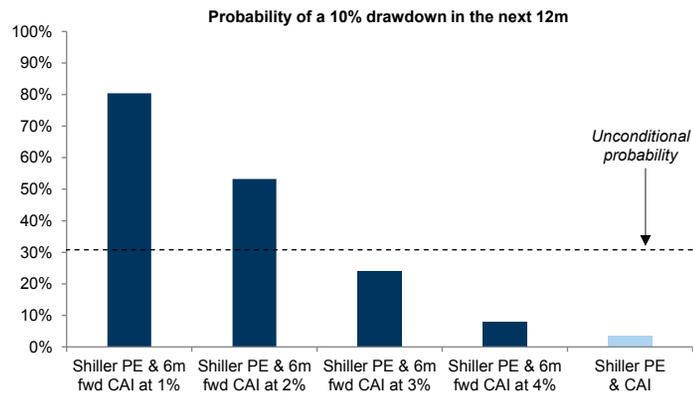
Exhibit 36: Probability of a 20% S&P 500 rally in the next 12m based on the current level of our RAI and CAI changes

Orange shading: 20% up move in next 12m



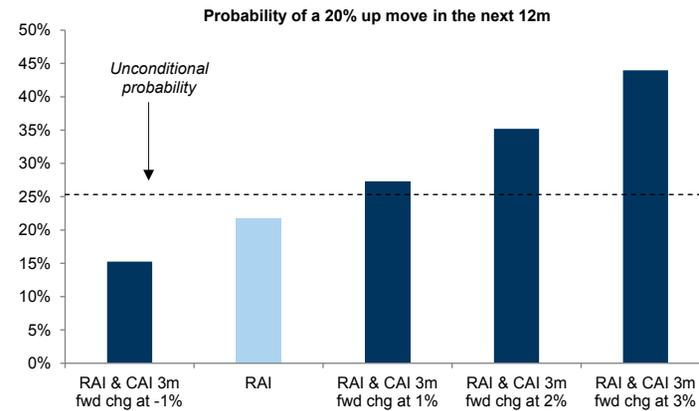
Source: Haver Analytics, Datastream, Goldman Sachs Global Investment Research

Exhibit 37: Probability model scenarios with different assumptions on the level of growth
Unconditional probability since 1990



Source: Datastream, Haver Analytics, Goldman Sachs Global Investment Research

Exhibit 38: Probability model scenarios with different growth assumptions
Unconditional probability since 1990

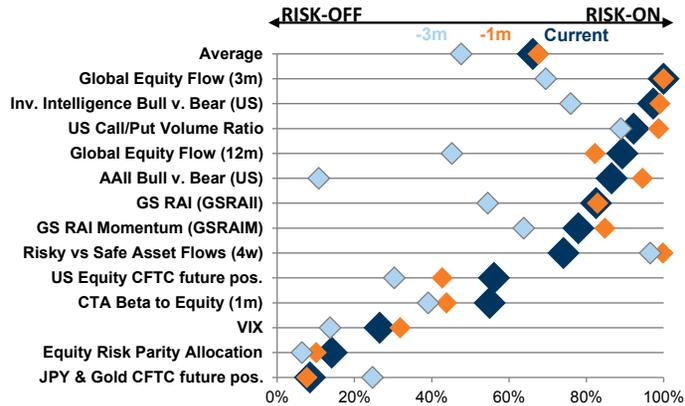


Source: Datastream, Haver Analytics, Goldman Sachs Global Investment Research

Cross-asset: Sentiment and Positioning

Exhibit 39: Percentile of sentiment indicators

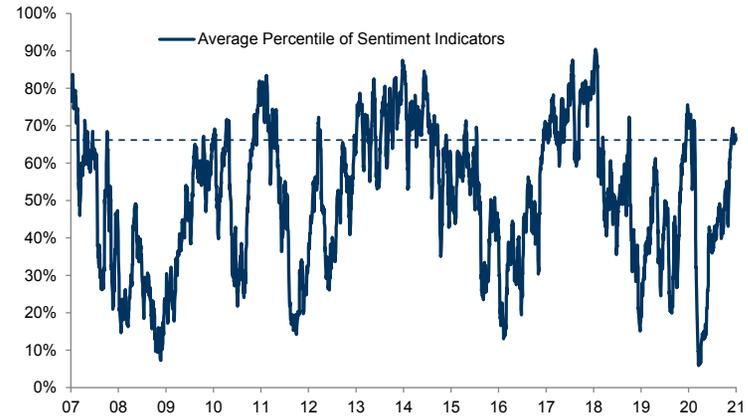
Data since 2007



Source: Datastream, Haver Analytics, Goldman Sachs Global Investment Research

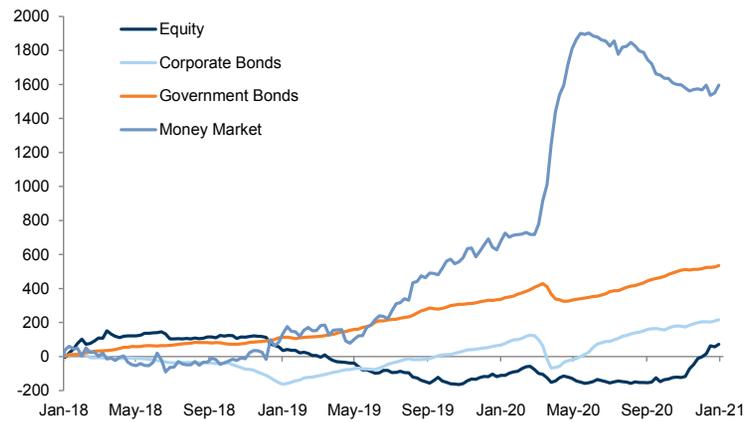
Exhibit 40: Average percentile of sentiment indicators

Data since 2007



Source: Datastream, Haver Analytics, Goldman Sachs Global Investment Research

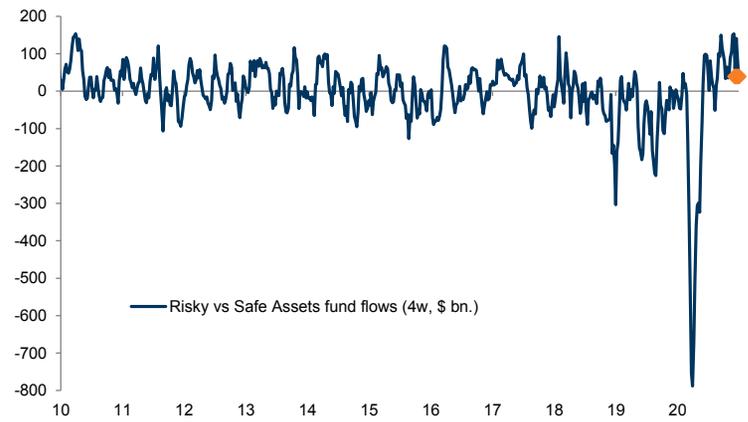
Exhibit 41: Cumulative fund flows across assets



Source: Datastream, Haver Analytics, Goldman Sachs Global Investment Research

Exhibit 42: Risky vs. safe assets fund flows

4 weeks rolling flows, USD bn



Source: Datastream, Haver Analytics, Goldman Sachs Global Investment Research

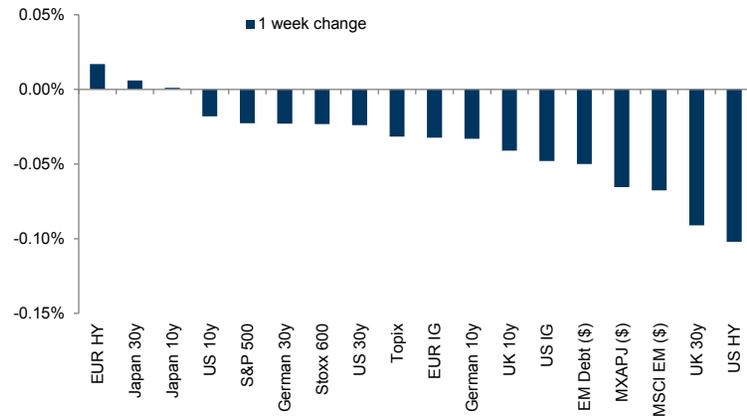
Cross-asset: Yields

Exhibit 43: Current yields across assets and their percentile to the past 10 years

Valuation metric	Equity					Government bonds				Credit				
	S&P 500	Stoxx 600	MXAPJ (\$)	Topix	MSCI EM (\$)	US 10y	German 10y	Japan 10y	UK 10y	US IG	EUR IG	US HY	EUR HY	EM Debt (\$)
Current:	1.6%	3.0%	2.3%	2.1%	2.3%	0.9%	-0.6%	0.0%	0.2%	1.2%	0.3%	5.0%	3.2%	4.5%
Percentile (-10y):	0%	0%	0%	40%	0%	7%	3%	26%	3%	1%	1%	0%	6%	2%
Average:	2.1%	3.8%	3.2%	2.3%	3.0%	2.1%	0.8%	0.4%	1.7%	2.7%	1.6%	6.9%	5.0%	5.6%
95th:	2.4%	4.5%	3.7%	2.8%	3.4%	3.1%	2.9%	1.1%	3.3%	3.8%	4.4%	8.6%	8.8%	6.6%
5th:	1.9%	3.3%	2.7%	1.8%	2.6%	0.7%	-0.6%	-0.1%	0.3%	1.5%	0.5%	6.0%	3.2%	4.6%
3m real. ret. vol:	16.7%	17.1%	14.6%	12.5%	13.2%	5.5%	3.9%	0.9%	5.6%	4.4%	1.3%	4.4%	3.2%	4.4%
Percentile (-10y):	74%	69%	31%	47%	42%	38%	11%	1%	41%	73%	3%	71%	65%	68%
Yield/vol ratio	0.09	0.18	0.16	0.17	0.18	0.17	-0.15	0.02	0.04	0.27	0.20	1.13	0.98	1.01

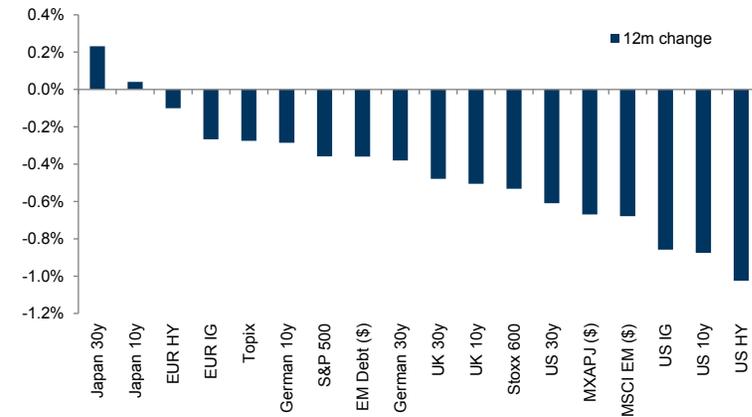
Source: Datastream, iBoxx, Goldman Sachs Global Investment Research

Exhibit 44: Past week change in yields across assets



Source: Datastream, iBoxx, Goldman Sachs Global Investment Research

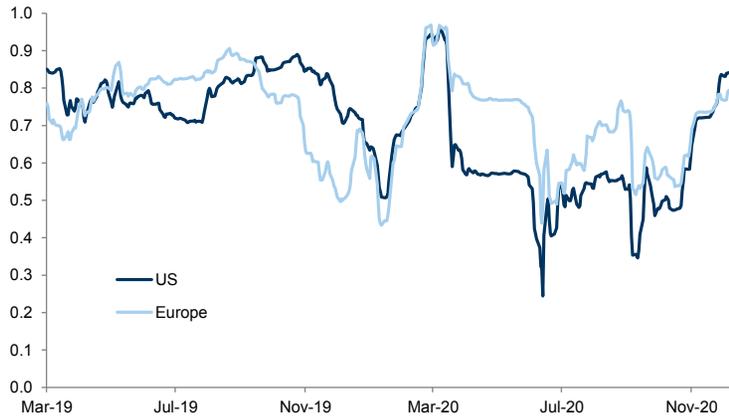
Exhibit 45: 12m change in yields across assets



Source: Datastream, iBoxx, Goldman Sachs Global Investment Research

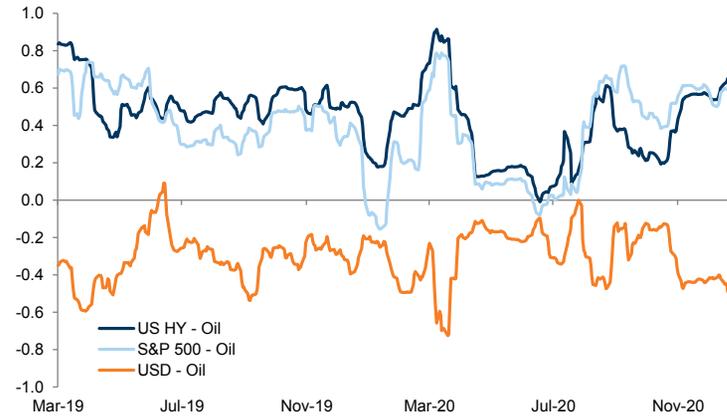
Cross-asset: Correlations: Equity vol/CDS, commodity prices/credit & FX, equity/bond, equity/FX

Exhibit 46: 3m rolling equity vol/CDS correlation of weekly level changes
 CDX HY for the US, iTraxx Xover for Europe; ATM implied vol for S&P 500 and Euro Stoxx 50



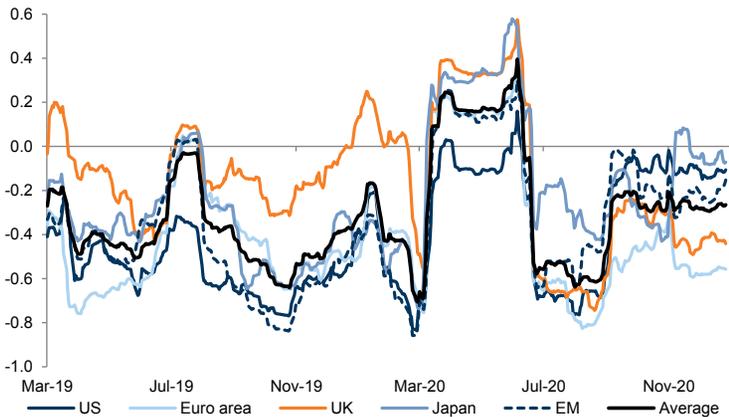
Source: Datastream, Goldman Sachs, Goldman Sachs Global Investment Research

Exhibit 47: 3m rolling commodity price correlations of weekly % changes with different assets



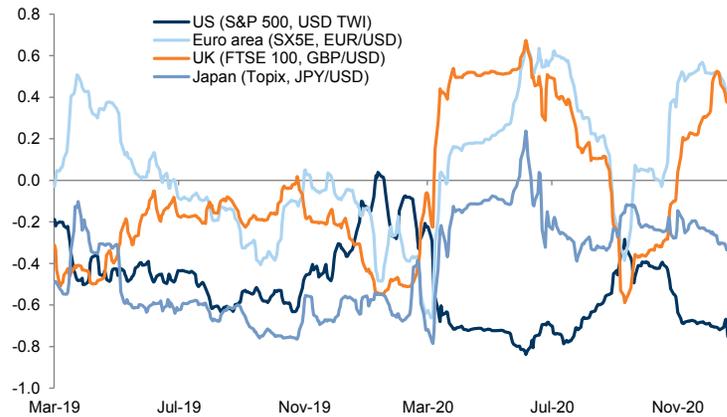
Source: Datastream, Goldman Sachs, Goldman Sachs Global Investment Research

Exhibit 48: 3m rolling equity/bond correlation of weekly returns



Source: Datastream, Goldman Sachs Global Investment Research

Exhibit 49: 3m rolling equity/FX correlation of weekly returns



Source: Datastream, Goldman Sachs Global Investment Research

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Cross-asset: Implied and realised vol, call and put skew

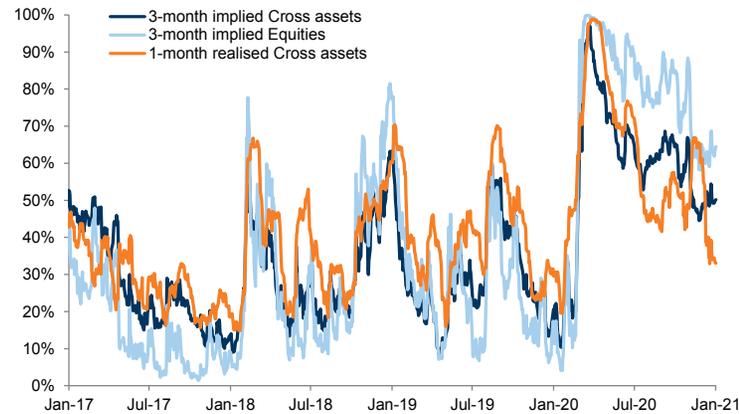
Exhibit 50: Cross-asset volatility, current and historical percentiles, implied 3m and realised 1m

	Equities						Rates				Credit			Commodities			Currencies		
	S&P 500	EURO STOXX 50	Nikkei 225	FTSE 100	MSCI EM	MSCI EAFE	USD 2-year	USD 10-year	EUR 2-year	EUR 10-year	CDX IG	CDX HY	iTraxx Europe	WTI	Gold	Copper	EUR/USD	JPY/USD	GBP/USD
Implied (3-month ATM, %)																			
Current:	18.9	19.6	18.2	20.1	20.6	18.1	1.0	3.9	0.9	2.0	62.4	59.1	62.2	35.5	18.4	21.3	6.5	6.5	8.8
Percentile:	82%	58%	39%	86%	55%	68%	1%	18%	6%	0%	88%	87%	75%	68%	80%	58%	18%	13%	55%
1M change:	-0.2	1.7	-0.9	2.0	-0.6	1.0	-0.1	0.1	0.0	-0.1	4.1	3.4	6.4	-3.0	0.8	-0.5	-0.2	0.2	-0.7
Average:	15.7	19.3	19.8	15.4	21.0	17.0	3.0	4.8	2.0	3.6	50.7	46.9	56.6	32.5	15.4	21.6	8.6	9.1	8.9
95th:	26.5	30.6	27.1	24.7	31.5	29.1	4.8	7.0	5.3	6.1	73.7	78.3	86.4	50.4	23.0	30.9	13.1	12.7	12.7
5th:	10.0	12.3	13.8	10.3	15.2	10.4	1.3	3.5	0.9	2.2	38.7	30.7	40.3	17.1	9.7	15.2	5.1	5.8	5.8
Realised (%)																			
1-month:	8.2	14.1	12.4	14.7	10.9	11.0	0.7	3.0	0.7	1.7	29.1	23.7	50.4	21.6	16.4	16.8	5.6	3.8	11.8
Percentile:	21%	34%	17%	64%	30%	45%	2%	12%	31%	5%	28%	25%	76%	25%	68%	38%	16%	1%	93%
Average:	14.5	18.8	19.6	14.8	14.6	13.6	2.7	4.5	1.5	3.2	39.0	34.5	44.2	35.6	15.2	19.8	8.1	8.4	8.3

Source: Goldman Sachs, Goldman Sachs Global Investment Research

Exhibit 51: 10y percentile for cross-asset average volatility

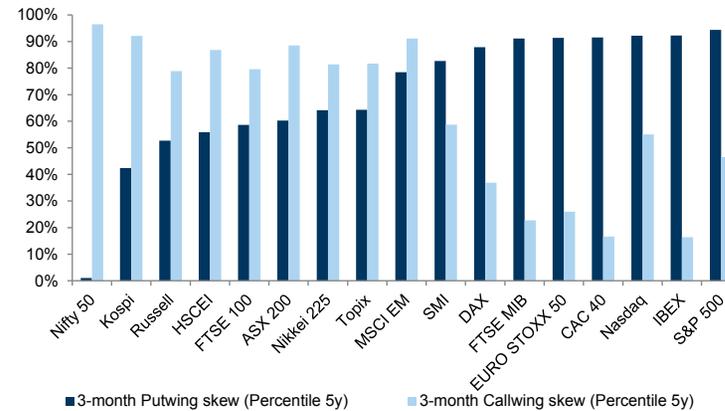
Using 16 assets across equity, government bonds, credit, commodities and FX



Source: Goldman Sachs, Goldman Sachs Global Investment Research

Exhibit 52: Putwing and Callwing normalised skew 5y percentile

Normalised skew = (impl. vol 25 delta put/call minus implied vol 50 delta call)/50 delta call

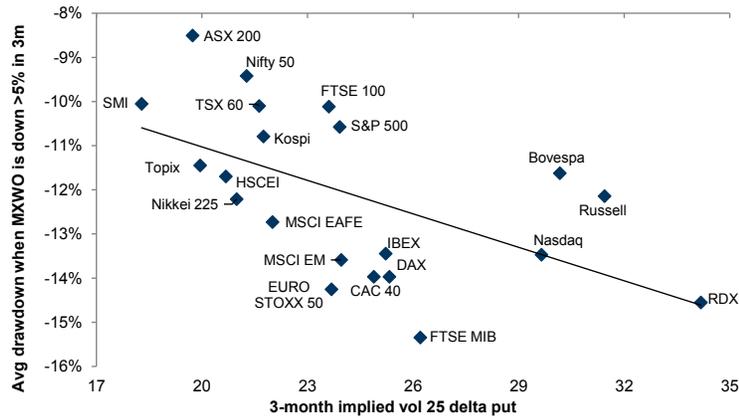


Source: Goldman Sachs, Goldman Sachs Global Investment Research

Cross-asset: Alternatives and option strategies

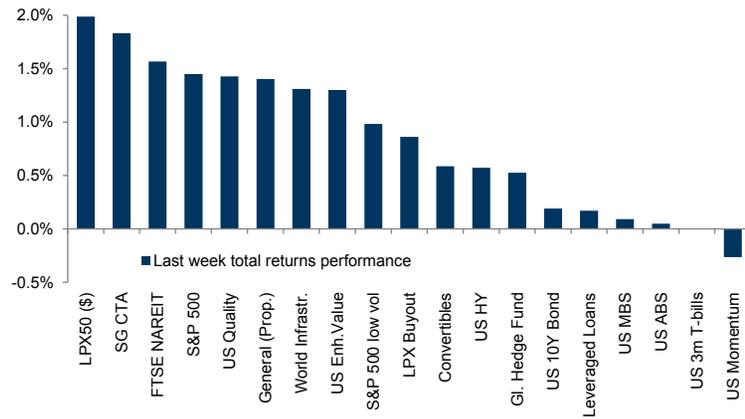
Exhibit 53: Implied volatility (3-month 25 delta put) vs. average drawdown during MXWO corrections

3m put 25 delta put option implied vol vs. average performance during a 5% S&P 500 drawdown



Source: Goldman Sachs Global Investment Research

Exhibit 55: Last week performance of alternative assets or strategies



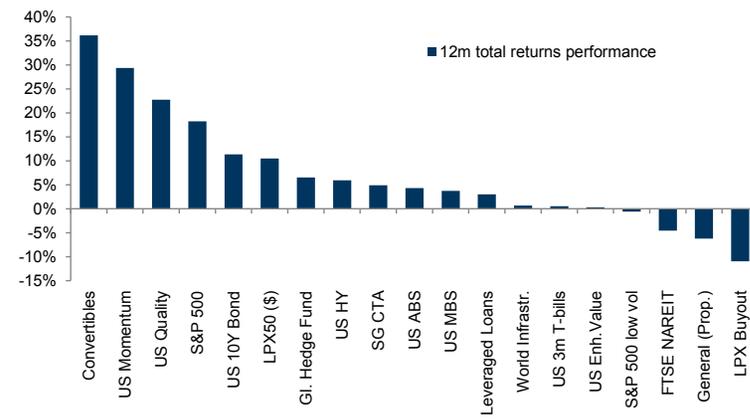
Source: Bloomberg, Datastream, Goldman Sachs Global Investment Research

Exhibit 54: Systematic option strategies vs. S&P 500 performance
CBOE Strategies vs. S&P 500 performance



Source: Bloomberg, Goldman Sachs Global Investment Research

Exhibit 56: 12m performance of alternative assets or strategies

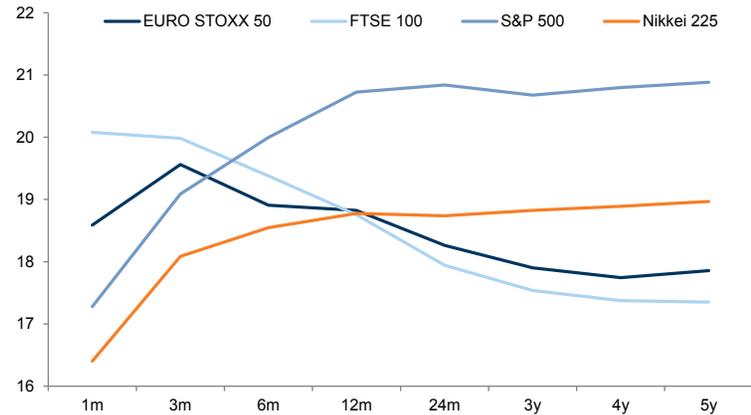


Source: Bloomberg, Datastream, Goldman Sachs Global Investment Research

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Cross-asset: Volatility, skew, CDS with equity vol, rate vol

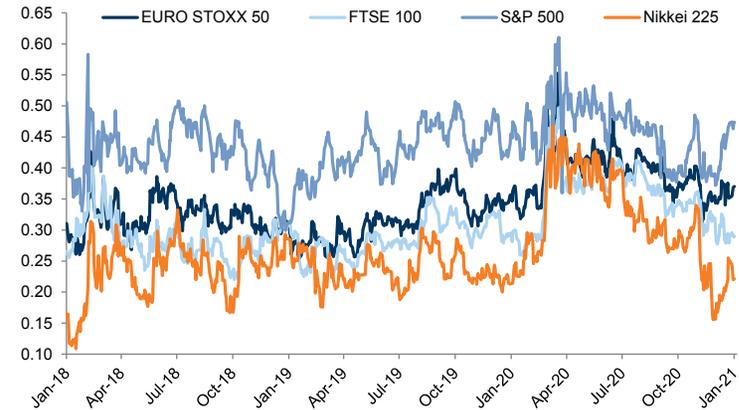
Exhibit 57: ATM implied volatility term structure for equity indices



Source: Goldman Sachs, Goldman Sachs Global Investment Research

Exhibit 58: Normalised implied volatility skew across regions

3m 25 delta put vol minus 25 delta call vol scaled by ATM implied vol



Source: Goldman Sachs, Goldman Sachs Global Investment Research

Exhibit 59: CDS and equity vol levels in the US

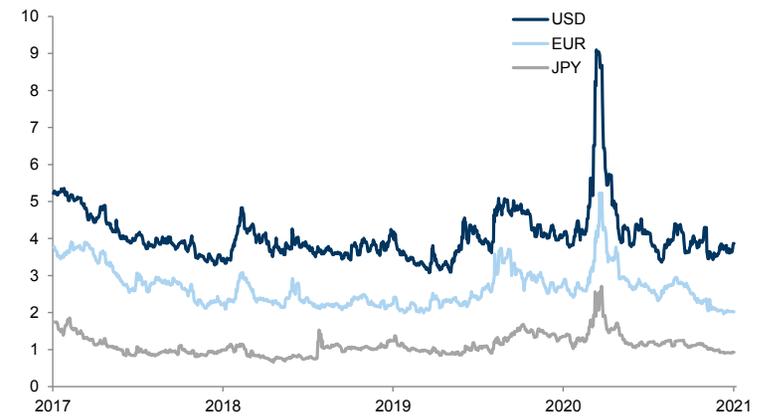
CDX HY, 3m ATM S&P 500 implied vol



Source: Goldman Sachs, Goldman Sachs Global Investment Research

Exhibit 60: 3m ATM implied rate volatility across regions

3-month implied volatility of 10-year rates (bp/day)

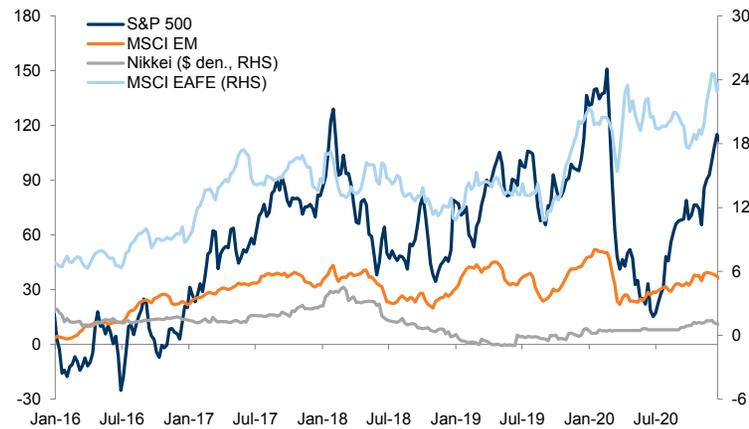


Source: Goldman Sachs, Goldman Sachs Global Investment Research

Cross-asset: CFTC positioning

Exhibit 61: Equity net long positioning

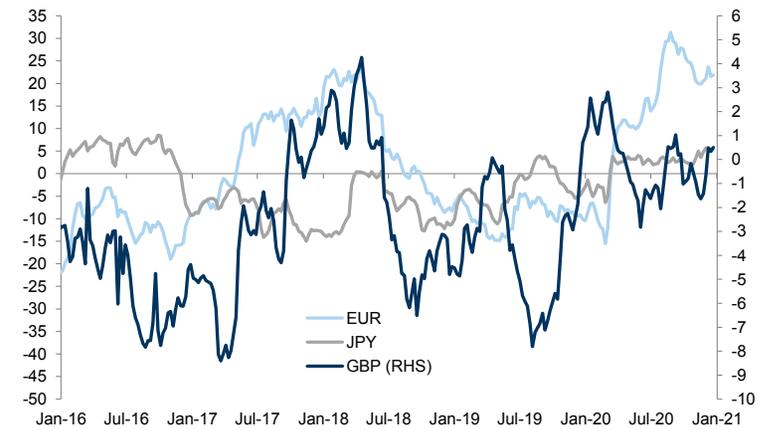
Leveraged funds and asset managers net future positions (\$ bn)



Source: Bloomberg, CFTC, Goldman Sachs Global Investment Research

Exhibit 62: Currency net long positioning

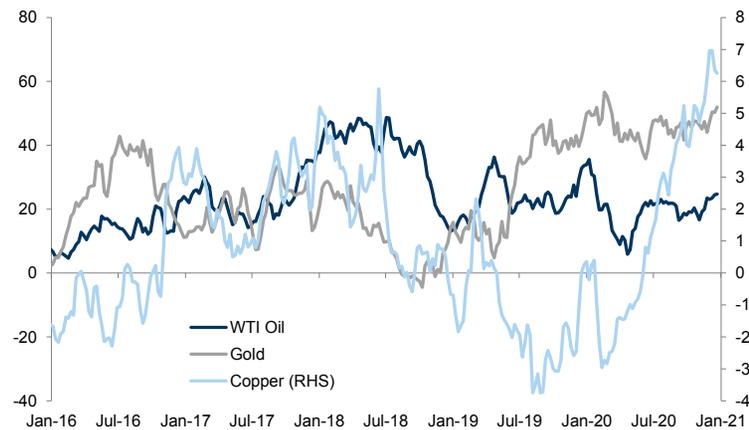
Net non-commercial positions (\$ bn)



Source: Bloomberg, CFTC, Goldman Sachs Global Investment Research

Exhibit 63: Commodity net long positioning

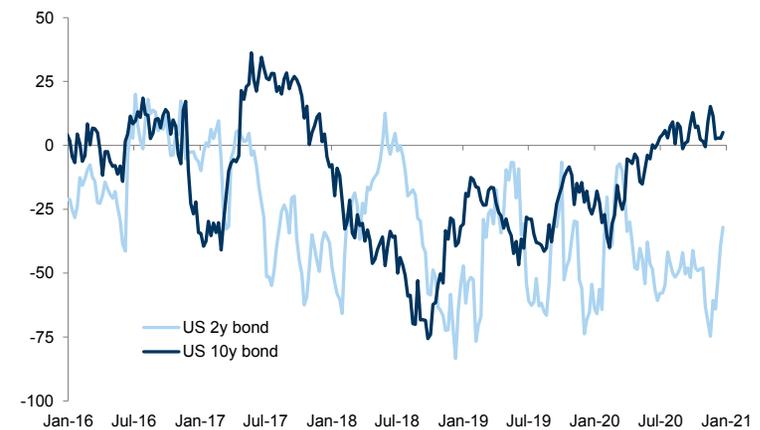
Net non-commercial positions (\$ bn)



Source: Bloomberg, CFTC, Goldman Sachs Global Investment Research

Exhibit 64: US Treasury net long positioning

Net non-commercial positions (\$ bn)

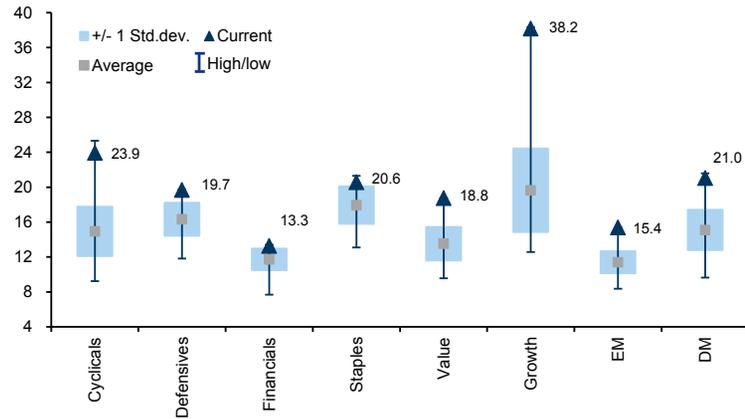


Source: Bloomberg, CFTC, Goldman Sachs Global Investment Research

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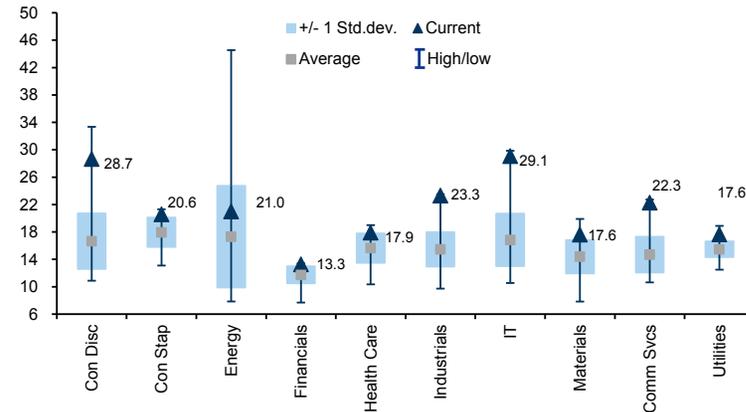
Equity: Valuation and styles

Exhibit 65: Valuation ranges of MSCI World styles indices
12-month forward P/Es relative to the last 10 years



Source: Datastream, I/B/E/S, Goldman Sachs Global Investment Research

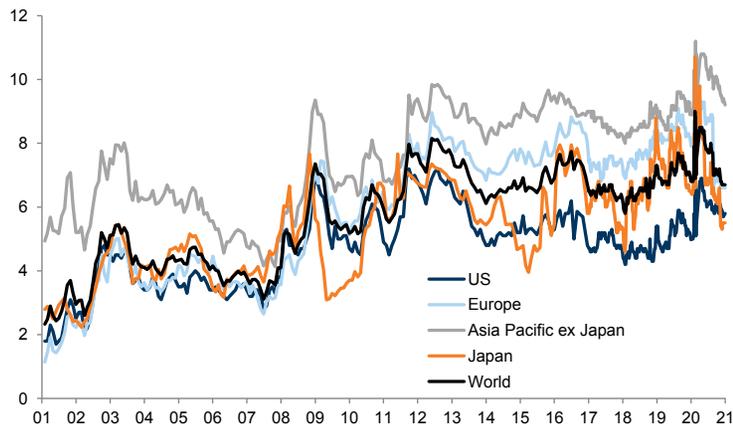
Exhibit 66: MSCI World sector valuations
12-month forward P/Es relative to the last 10 years



Source: Datastream, I/B/E/S, Goldman Sachs Global Investment Research

Exhibit 67: Global market implied ERPs (%)

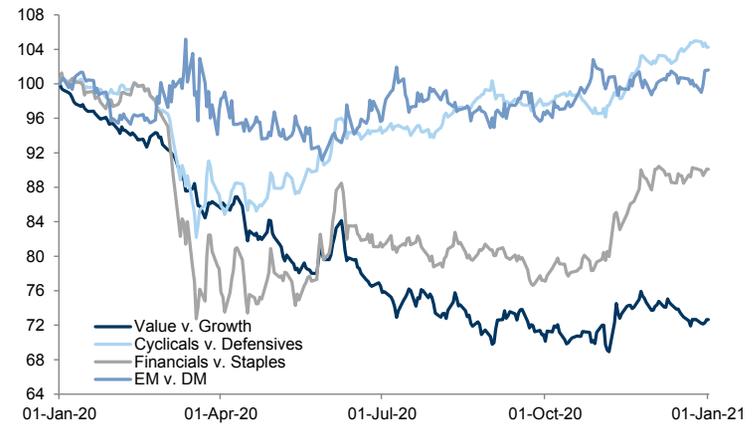
Implied ERPs are calculated by each regional strategy team. While specific assumptions differ between regions, all are calculated using similar frameworks



Source: Datastream, Goldman Sachs Global Investment Research

Exhibit 68: MSCI World style index performance

Performance indexed to 100 12m ago

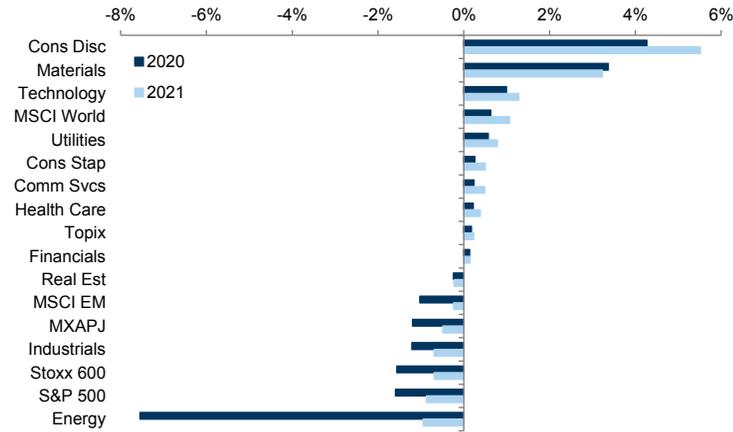


Source: Datastream, Goldman Sachs Global Investment Research

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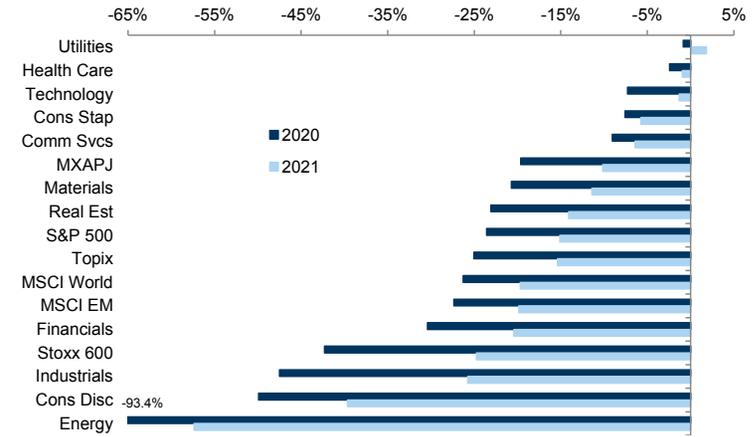
Equity: Earnings

Exhibit 69: 1-month revision to I/B/E/S 2020E and 2021E consensus earnings
MSCI World sectors, other global equity index aggregates



Source: Datastream, I/B/E/S, Goldman Sachs Global Investment Research

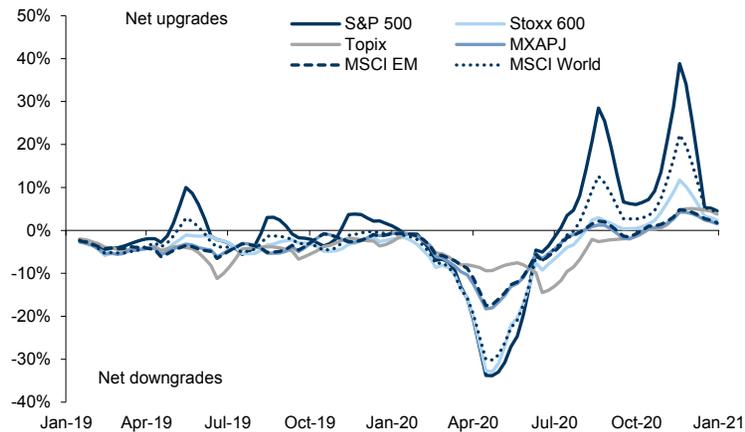
Exhibit 70: 12-month revision to I/B/E/S 2020E and 2021E consensus earnings
MSCI World sectors, other global equity index aggregates



Source: Datastream, I/B/E/S, Goldman Sachs Global Investment Research

Exhibit 71: Earnings sentiment: Analyst upgrades minus downgrades (scaled by total analysts) across markets

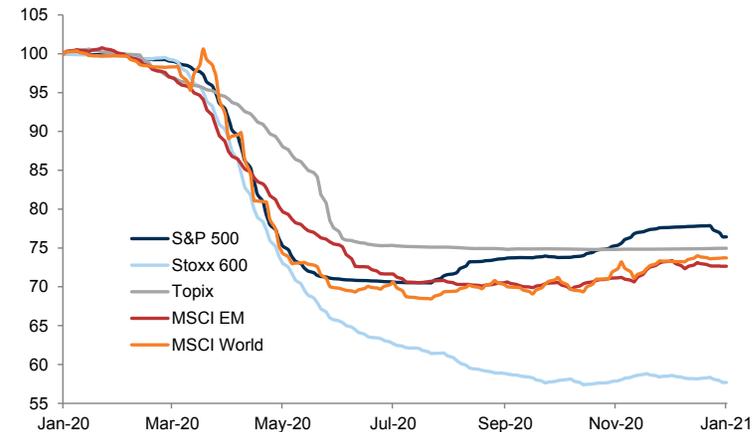
1-month moving average of net monthly upgrades



Source: Datastream, I/B/E/S, Goldman Sachs Global Investment Research

Exhibit 72: 2020 consensus earnings expectations over the past 12 months

Earnings indexed to 100 12 months ago

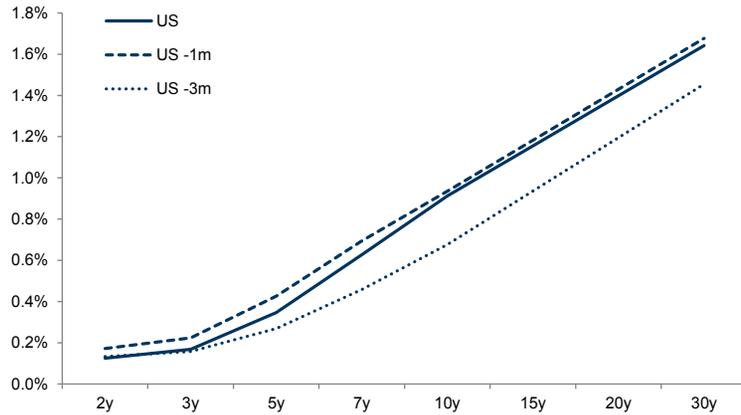


Source: Datastream, I/B/E/S, Goldman Sachs Global Investment Research

Government bonds: Yield curves and Sudoku mispricing

Exhibit 73: US yield curve dynamics

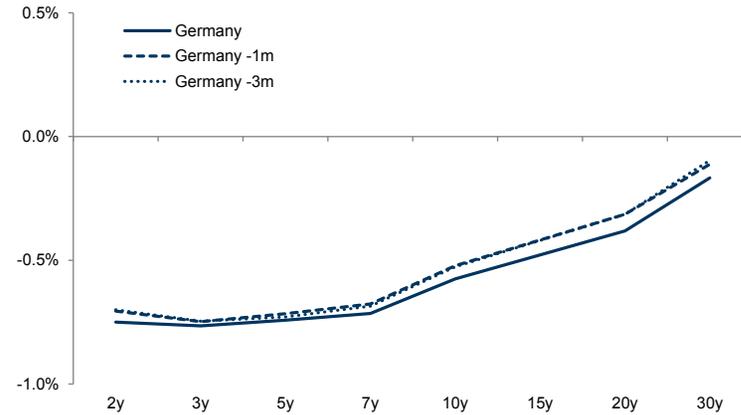
Current relative to 1 month and 3 months ago



Source: Datastream, Goldman Sachs Global Investment Research

Exhibit 74: German yield curve dynamics

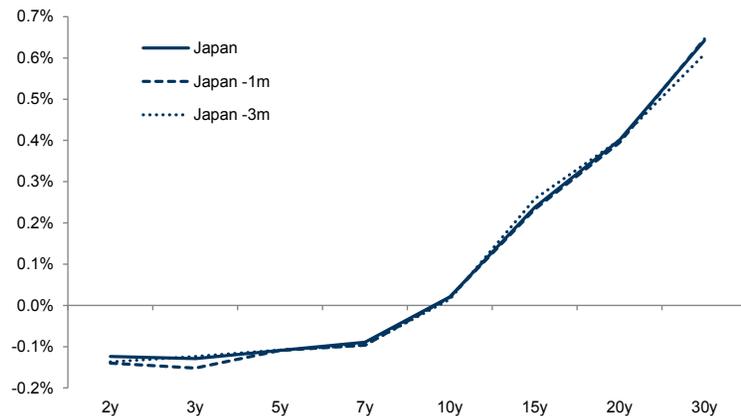
Current relative to 1 month and 3 months ago



Source: Datastream, Goldman Sachs Global Investment Research

Exhibit 75: Japan yield curve dynamics

Current relative to 1 month and 3 months ago



Source: Goldman Sachs Global Investment Research

Exhibit 76: Yield curve term slope across regions

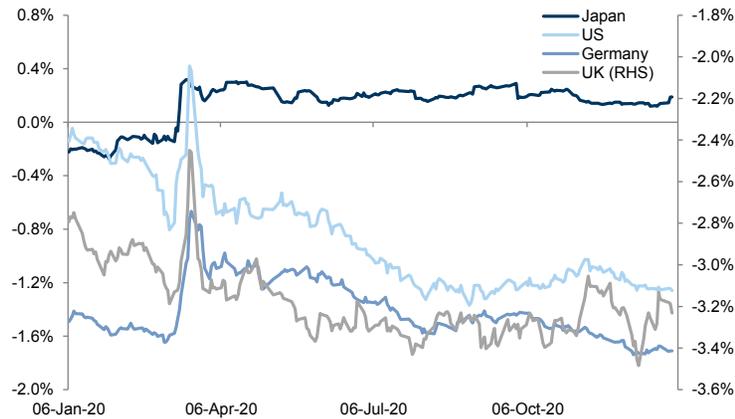


Source: Goldman Sachs Global Investment Research

Government bonds: Real yields, inflation, breakevens, 10y IR differentials

Exhibit 77: 10y real yields across regions

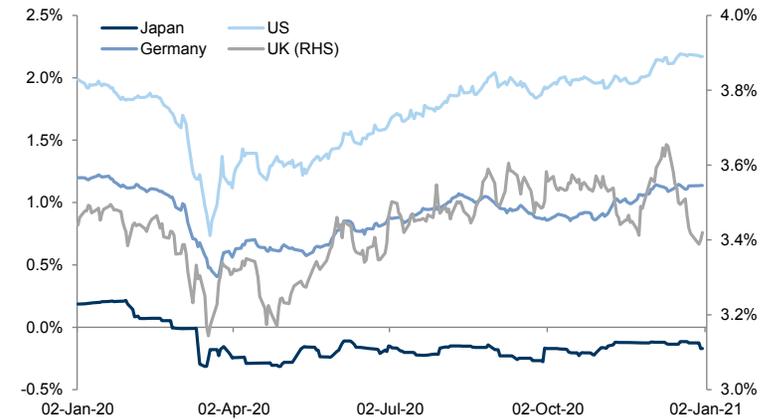
Nominal bond yield minus CPI inflation swap (RPI for the UK)



Source: Goldman Sachs, Goldman Sachs Global Investment Research

Exhibit 78: 10y inflation swaps across regions

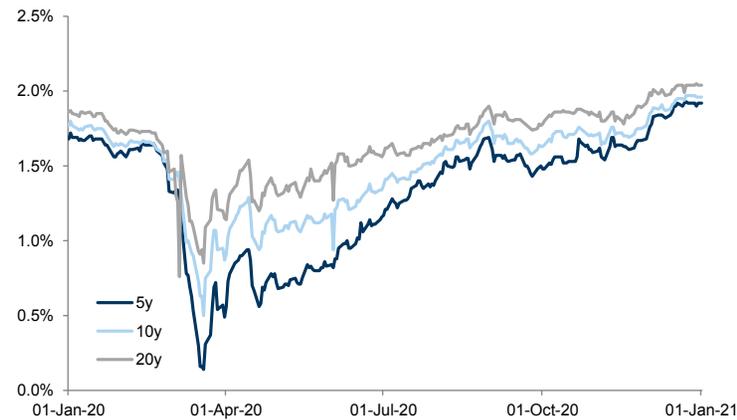
CPI inflation swap (RPI for the UK)



Source: Goldman Sachs, Goldman Sachs Global Investment Research

Exhibit 79: US breakeven inflation

Nominal yield minus TIPS yield



Source: Datastream, Goldman Sachs Global Investment Research

Exhibit 80: 10y nominal bond yield differentials



Source: Datastream, Goldman Sachs Global Investment Research

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Credit: Spreads - history and forecasts

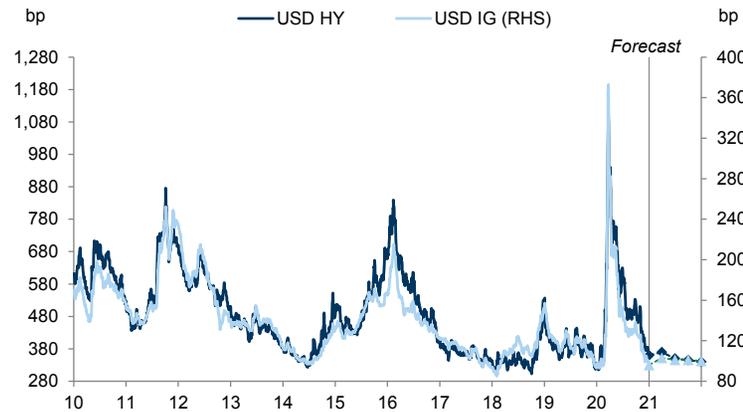
Exhibit 81: Credit spread forecasts

Yieldbook Citi US IG, iBoxx EUR IG, BAML US HY and EUR HY

Sector	Updated through Jan 01, 2021				
	Current	2021Q1	2021Q2	2021Q3	2021Q4
USD Spreads					
IG	96	103	101	101	100
IG Fin	83	97	95	95	94
IG Non-Fin	101	109	107	107	106
High Yield	360	370	350	345	340
EUR Spreads					
IG	101	100	97	97	96
IG Fin	107	106	102	101	99
IG Non-Fin	98	96	94	93	92
High Yield	355	365	340	335	330

Source: BAML, Haver Analytics, iBoxx, Yieldbook Citi, Goldman Sachs Global Investment Research

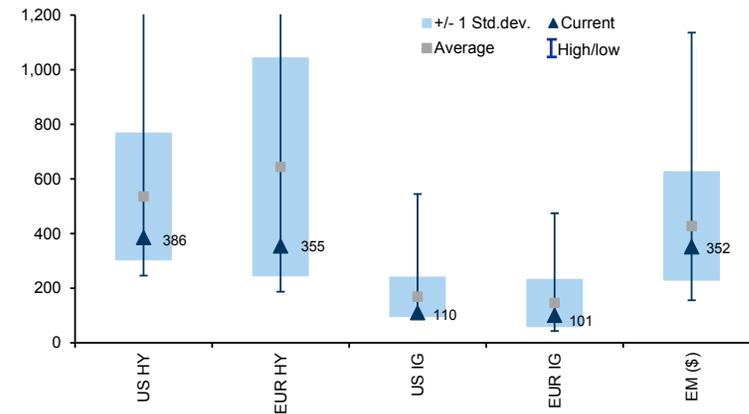
Exhibit 83: Our USD spread forecast for IG vs. HY



Source: The Yield Book Inc.; Citi Index, Goldman Sachs Global Investment Research

Exhibit 82: Current credit spreads relative to their historical ranges

Credit spreads (US HY and IG since 1985, EUR IG since 1997, EUR HY and EM since 1998)



Source: Haver Analytics, iBoxx, Goldman Sachs Global Investment Research

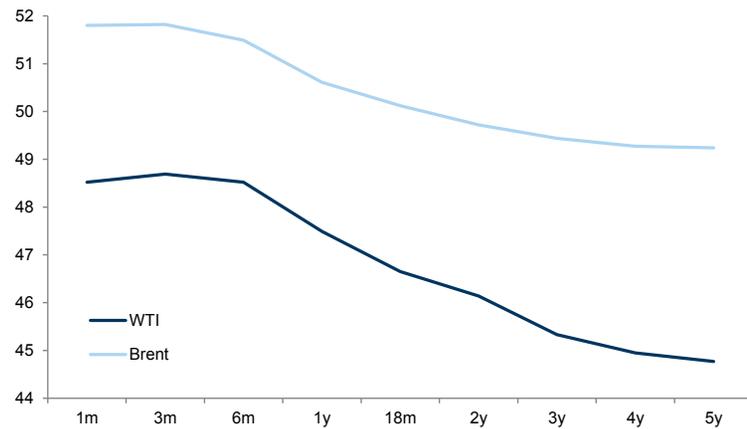
Exhibit 84: Our EUR spread forecast for IG vs. HY



Source: iBoxx, Goldman Sachs Global Investment Research

Commodities: Curve shapes and roll yields

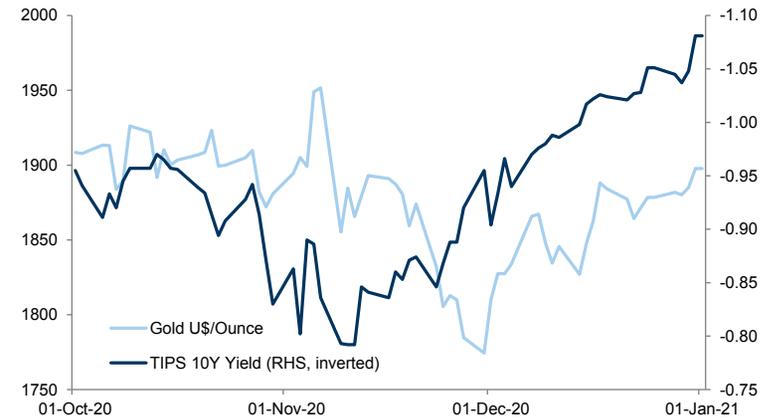
Exhibit 85: WTI and Brent oil forward curves



Source: Goldman Sachs, Goldman Sachs Global Investment Research

Exhibit 86: Gold price and US real yields

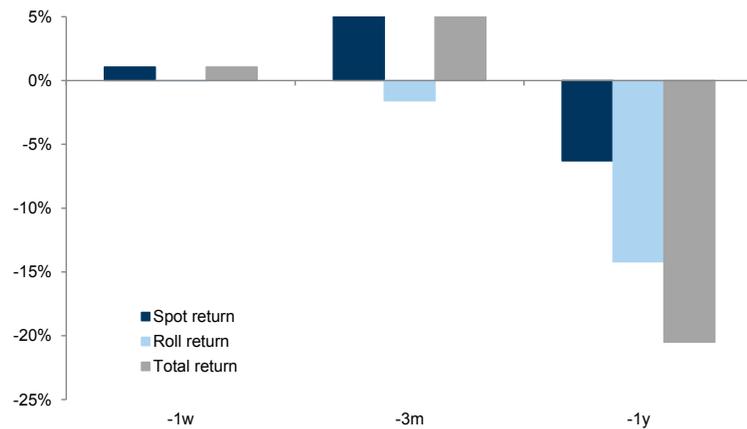
US 10-year TIPS yield, Gold US/ounce



Source: Datastream, Goldman Sachs Global Investment Research

Exhibit 87: GSCI® Enhanced spot, roll and total returns

Returns over the past 1 week, 3 months and 1 year



Source: Datastream, Goldman Sachs Global Investment Research

Exhibit 88: Recent performance of GSCI® Enhanced sectors

Weight signifies contribution to the GSCI® Enhanced index

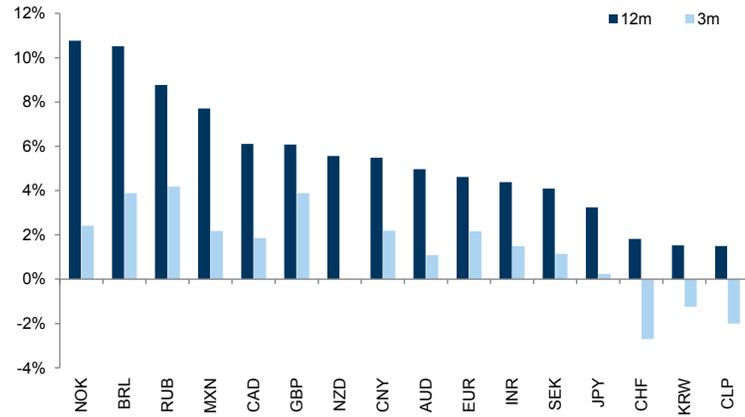
	Current Weight (%)	Returns (%)		
		-1w	-1m	-1y
S&P GSCI Enhanced	100.0	1.1	5.5	-21.3
Energy	51.5	0.7	6.1	-40.1
Industrial Metals	12.8	-1.4	-0.2	15.3
Precious Metals	6.8	0.8	3.6	21.2
Agriculture	21.5	4.0	9.5	13.7
Livestock	7.5	0.3	2.2	-21.8

Source: Goldman Sachs, Goldman Sachs Global Investment Research

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FX: Forecasts and forwards, recent performance and positioning

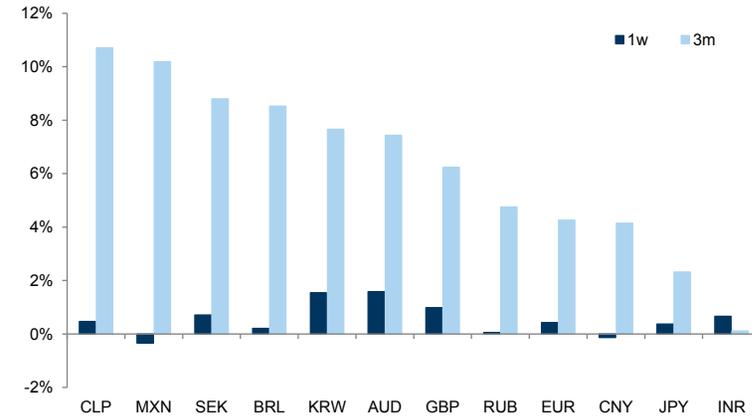
Exhibit 89: Our 3- and 12-month forecasts for dollar crosses



Source: Datastream, Goldman Sachs Global Investment Research

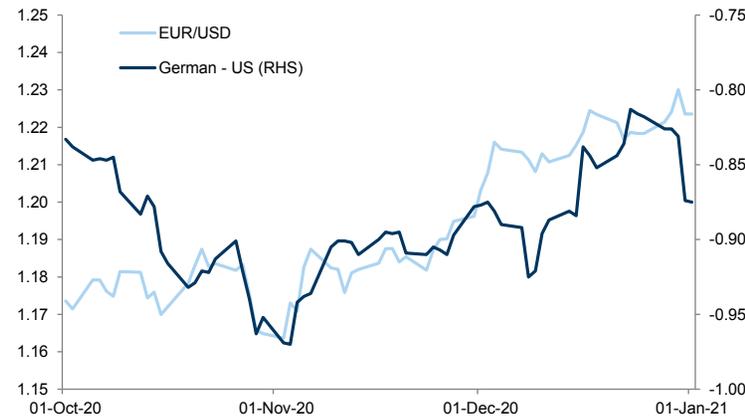
Exhibit 90: Recent performance of dollar crosses

Percentage change over past 1 week, 3 months



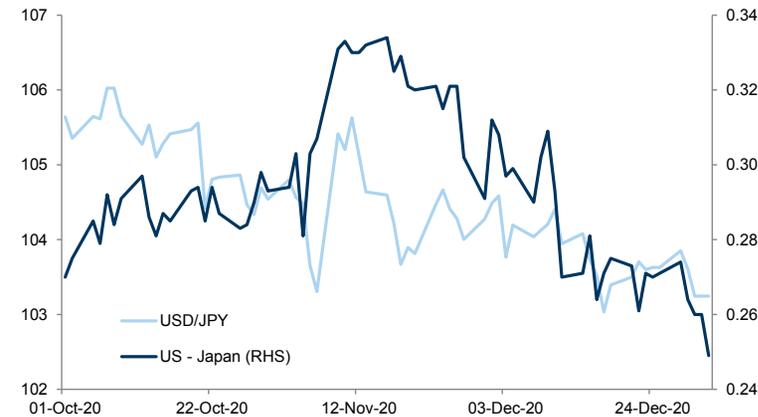
Source: Datastream, Goldman Sachs Global Investment Research

Exhibit 91: EUR/USD against German - US 2y interest rate differentials past 3m



Source: Datastream, Goldman Sachs Global Investment Research

Exhibit 92: USD/JPY against US - Japan 2y interest rate differentials past 3m



Source: Datastream, Goldman Sachs Global Investment Research

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Reg AC

We, Alessio Rizzi, Christian Mueller-Glissmann, CFA, Cecilia Mariotti, Andrea Ferrario and Peter Oppenheimer, hereby certify that all of the views expressed in this report accurately reflect our personal views, which have not been influenced by considerations of the firm's business or client relationships.

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