Goldman Sachs | Portfolio Strategy Research

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GOAL Kickstart

Commodity pessimism and cross-asset performance

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Last week China data for April deteriorated with import, inflation and bank lending data coming in weaker than expected. In the US, core CPI came in slightly above consensus and the Fed's Senior Loan Officer Survey reported less credit tightening than expected. Strong US labour market data remains supportive of the US economy and of broader cross asset pricing of cyclical growth.

Commodities tend to be the worst performing asset class as inflation normalizes, especially if there is a recession (Exhibit 1). Since March, both US rates and commodity markets have seemingly priced more growth risks — GSCI is tracking a more bearish outcome than on average post inflation peaks. Our economists expect US GDP growth to slow in H2 but remain above consensus on global growth. Our commodities team thinks recent sharp oil price declines (Exhibit 2) are due to excessive recession fears, positioning and excess supply concerns. With the large oil price declines there have been signs of dislocations for energy exposed assets with US and EU energy equity underperforming its beta to Brent the most (Exhibit 3). Energy FX has outperformed, while US breakeven inflation has performed broadly in line with its beta year-to-date.

Weak manufacturing in the US, China and Europe has weighed on industrial metals with the US regional banks stress and debt ceiling concerns likely exerting additional downward pressure (Exhibit 4). Gold performance on the other hand has been strong year-to-date and it has outperformed the S&P 500 strongly, which is unusual post inflation peaks (Exhibit 5). We think Gold remains an attractive portfolio diversifier with the additional support from central bank buying — given the strong run of performance year-to-date and positioning is leaning bullish, upside might be more limited. Still, Gold could gain additional steam on shocks related to debt ceiling turmoil.

Year-to-date the Dollar has been under pressure and the Dollar correlation with WTI and Copper has turned less negative (Exhibit 6). Gold on the flipside has helped diversify a weaker Dollar in portfolios. More recently, the Dollar has stabilised and our FX team expect a firmer dollar over the coming months given resilient US data which also have strengthened our economists view of no Fed cuts into year-end. We are OW commodities in our asset allocation and with a longer time horizon we see material upside, but believe volatility might linger near term.

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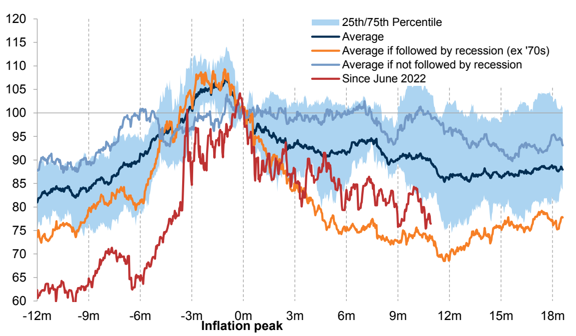
Investors should consider this report as only a single factor in making their investment decision. For Reg AC certification and other important disclosures, see the Disclosure Appendix, or go to www.gs.com/research/hedge.html.

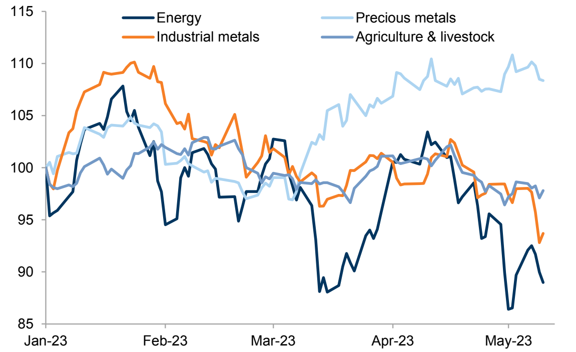
Commodity pessimism and cross-asset performance

Exhibit 1: GSCI is tracking a more bearish outcome than on average
GSCI total return post inflation peaks



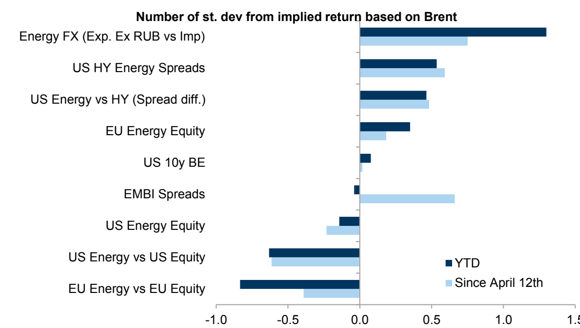
Source: Bloomberg, Goldman Sachs Global Investment Research

Exhibit 2: We have seen large divergences across the commodity complex
Year-to-date performance (%). S&P GSCI total return index



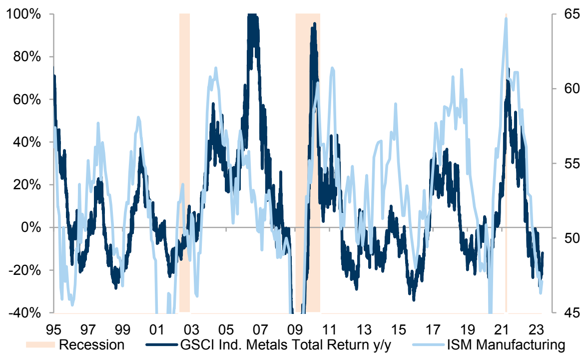
Source: Bloomberg, Goldman Sachs Global Investment Research

Exhibit 3: Energy exposed equity has underperformed its beta to Brent the most
Return vs. expected return based on relationship to Brent: (Actual ret. minus implied ret. by Brent)/ St. Dev of Errors. Data since 2016 and Brent 2y future price



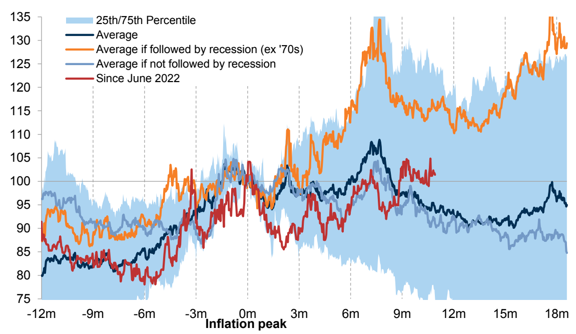
Source: Bloomberg, Datastream, Haver Analytics, Goldman Sachs Global Investment Research

Exhibit 4: Sluggish manufacturing activity has weighed on industrial metals
GSCI industrial metals total return y/y and ISM Manufacturing



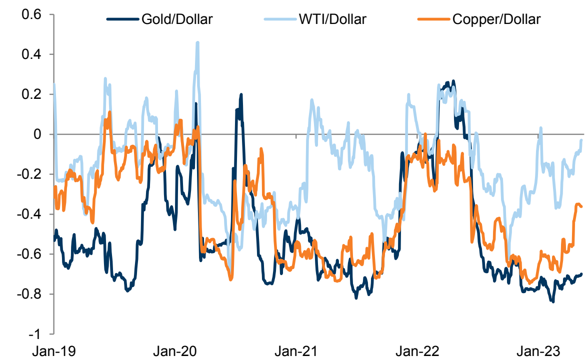
Source: Bloomberg, Goldman Sachs Global Investment Research

Exhibit 5: Gold has outperformed its average relationship with the S&P 500 past inflation peaks
Gold vs. S&P 500 ratio post inflation peaks



Source: Bloomberg, Goldman Sachs Global Investment Research

Exhibit 6: The dollar correlation for cyclical commodities has turned less negative
3-month correlation of weekly returns. Dollar = DXY



Source: Bloomberg, Goldman Sachs Global Investment Research

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Cross-asset: Forecasts

Exhibit 7: GOAL asset allocation recommendations and GS cross-asset forecasts

	Allocation Weighting		Current	Forecasts			Forecast Upside/Downside (%)		
	3m	12m	Level	3m	6m	12 m	3m	6m	12 m
Equities	**N**	**N**			**Index level**			**Total Return**	
S&P 500 ($)	UW	UW	4124	4000	4000	4000	-2.6	-2.1	-1.3
Stoxx Europe 600 (€)	OW	OW	465	465	470	475	0.8	2.8	5.6
MSCI Asia-Pacific Ex-Japan ($)	OW	OW	510	530	550	600	3.5	7.4	17.7
Topix (¥)	OW	OW	2096	2000	2050	2200	-4.4	-1.8	5.7
10 Year Government Bonds	**UW**	**UW**			**Yield (%)**			**Total Return**	
US	N	N	3.46	3.85	3.90	3.78	-2.3	-1.9	0.9
Germany	N	N	2.27	2.75	2.75	2.55	-3.4	-2.8	0.0
Japan	N	N	0.38	0.57	0.70	0.73	-1.1	-2.3	-2.4
UK	-	-	3.78	4.00	4.00	3.85	-0.4	0.6	3.7
Corporate Bonds	**N**	**N**			**Spread**			**Total Return**	
Bloomberg Barclays US IG	N	N	146	116	115	115	0.5	1.2	4.3
Bloomberg Barclays US HY	UW	N	473	395	390	390	2.6	3.7	6.6
iBoxx EUR IG	N	N	182	148	145	145	0.0	0.6	2.6
BAML EUR HY	UW	N	484	410	405	405	1.7	2.7	5.1
JP Morgan EMBI Div.	N	OW	484	470	457	430	-0.2	2.0	8.1
Commodities	**OW**	**OW**			**Spot price**			**Spot Return**	
WTI ($/bbl)	-	-	71	84	89	95	18.5	25.6	34.0
Brent ($/bbl)	-	-	74	89	94	100	20.0	26.7	34.8
Copper ($/mt)	-	-	8,223	9,500	10,000	11,000	15.5	21.6	33.8
Gold ($/troy oz)	-	-	2,010	2,050	2,050	2,050	2.0	2.0	2.0
FX	-	-			**Spot rate**			**Spot Return**	
EUR/USD	-	-	1.09	1.05	1.05	1.10	-3.3	-3.3	1.3
USD/JPY	-	-	135.3	132	125	125	-2.4	-7.6	-7.6
GBP/USD	-	-	1.25	1.22	1.21	1.26	-2.2	-3.0	1.0
AUD/USD	-	-	0.67	0.66	0.68	0.71	-0.8	2.2	6.7
USD/BRL	-	-	4.92	4.90	4.85	4.80	-0.5	-1.5	-2.5
USD/INR	-	-	82.2	83.0	82.0	82.0	1.0	-0.2	-0.2
USD/CNY	-	-	6.95	6.80	6.70	6.50	-2.2	-3.6	-6.5
Cash	**OW**	**OW**			**Spot rate**			**Total Return**	
US 3-month Tbill	-	-	-	-	-	-	1.30	2.57	4.80
Germany 3-month Bubills	-	-	-	-	-	-	0.75	1.53	3.12

Source: Bloomberg, Datastream, Bloomberg-Barclays, ICE-BAML, iBoxx, Goldman Sachs Global Investment Research

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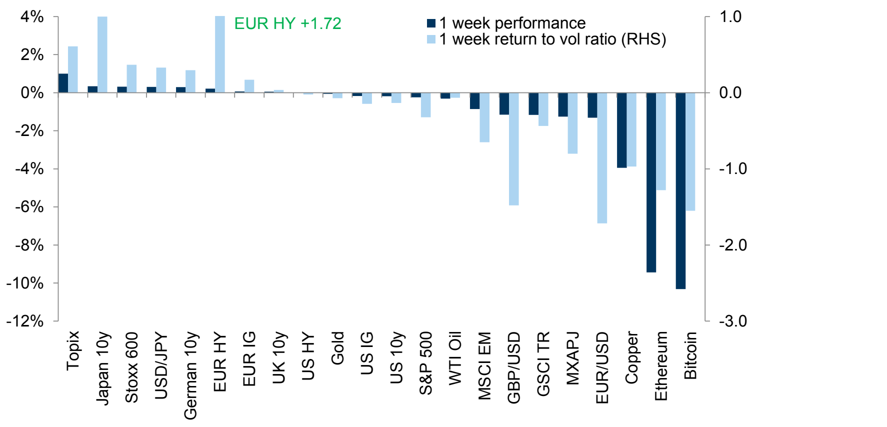
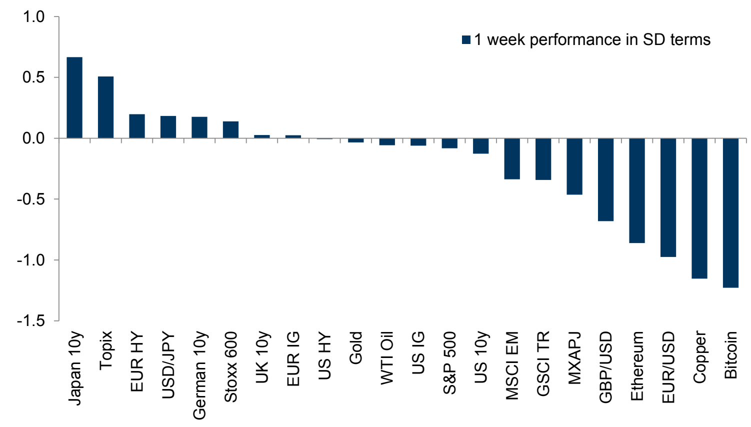
Cross-asset: Weekly and YTD performance, absolute and risk-adjusted

Exhibit 8: Local currency total returns and return to vol ratios over the past week
Weekly returns, return to vol ratios based on weekly volatility



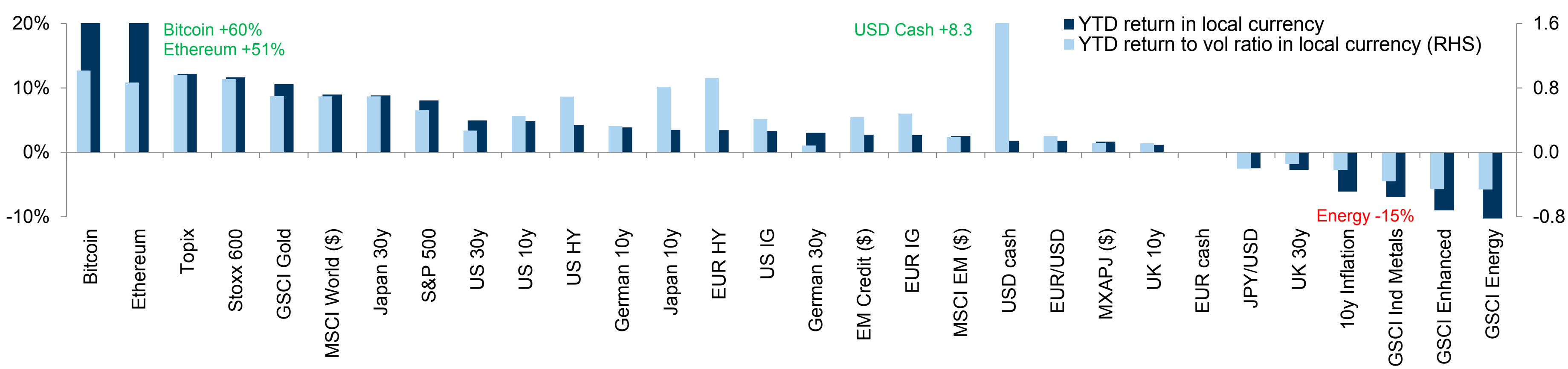
Source: Datastream, iBoxx, Goldman Sachs Global Investment Research

Exhibit 9: 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 10: Local currency returns and return to vol ratios
YTD returns



Source: Datastream, iBoxx, Goldman Sachs Global Investment Research

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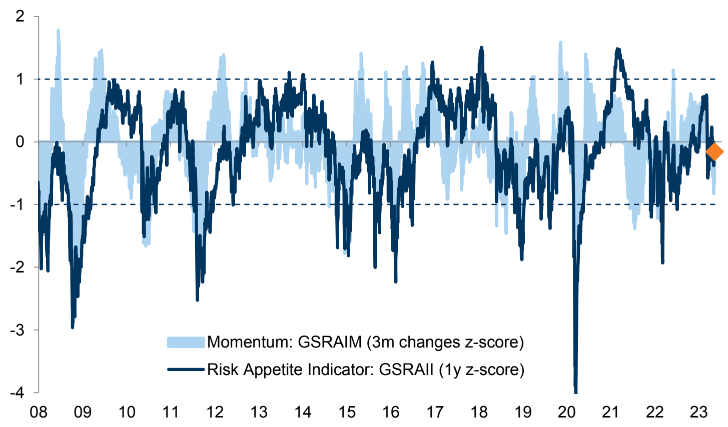
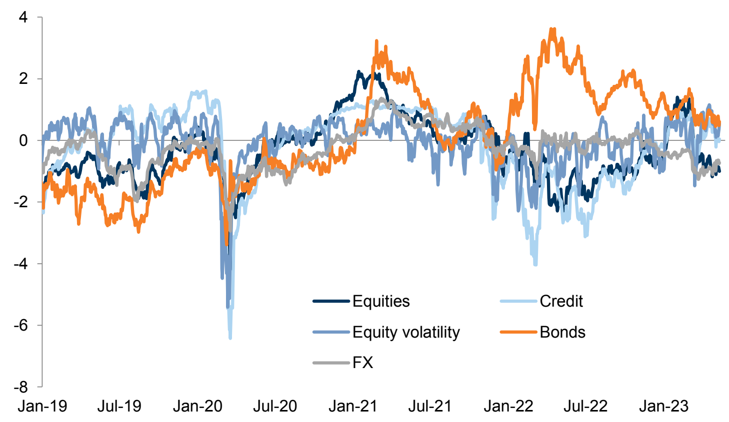
Cross-asset: Risk appetite indicator

Exhibit 11: Risk appetite indicator level and momentum factors
See July 2016 GOAL for construction details



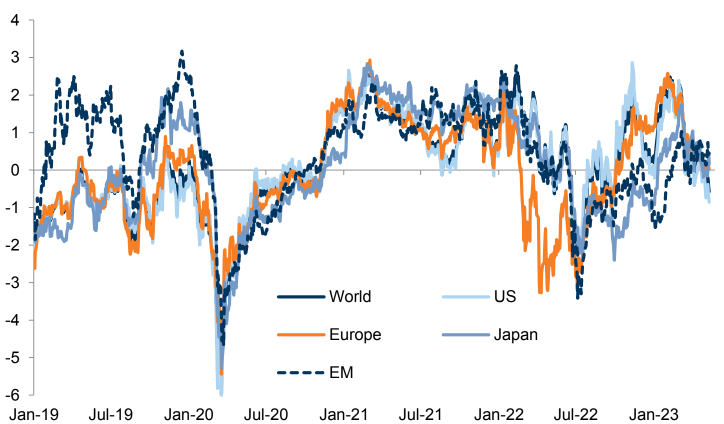
Source: Goldman Sachs Global Investment Research

Exhibit 12: Risk appetite indicators for different asset classes
See July 2016 GOAL for construction details



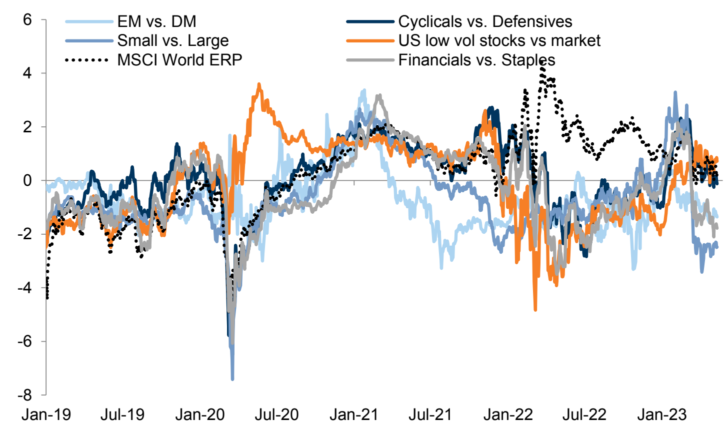
Source: Goldman Sachs Global Investment Research

Exhibit 13: Cyclicals vs. defensives 1-year rolling z-score across regions
See July 2016 GOAL for construction details



Source: Goldman Sachs Global Investment Research

Exhibit 14: Sub-components of equity risk appetite indicator
See July 2016 GOAL for construction details



Source: Goldman Sachs Global Investment Research

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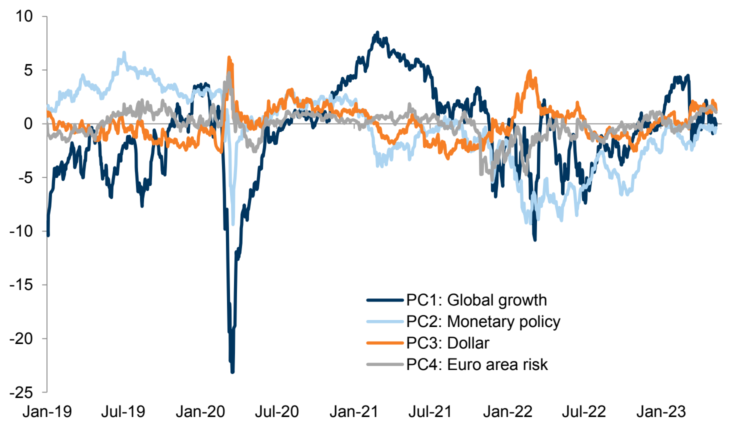
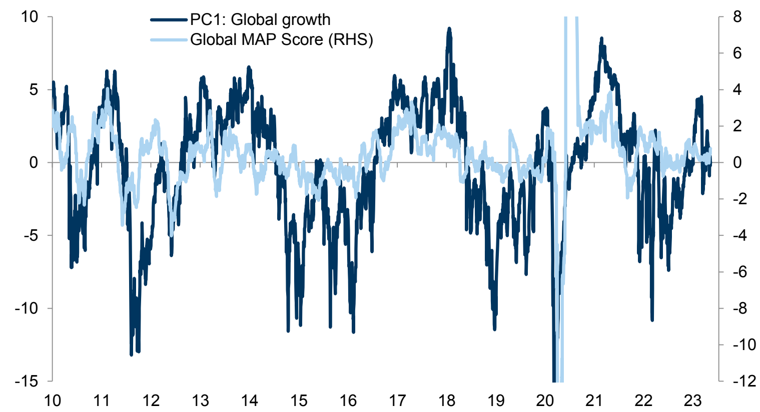
Cross-asset: Risk Appetite principal component analysis

Exhibit 15: GS RAI principal component
See April 2019 GOAL for construction details



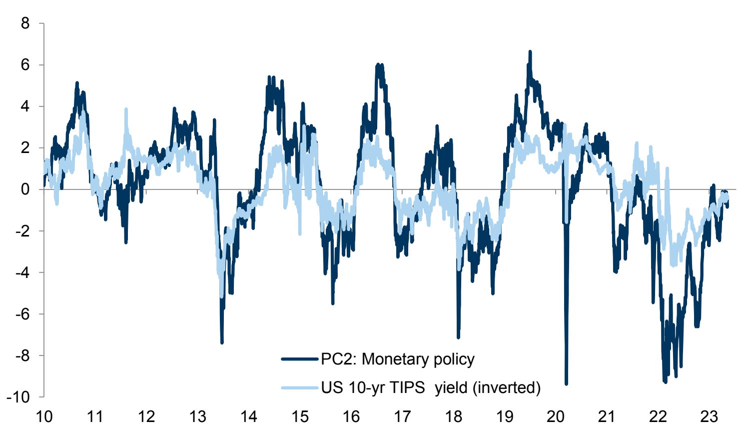
Source: Datastream, Goldman Sachs Global Investment Research

Exhibit 16: PC1: Global growth factor vs. Global MAP Score



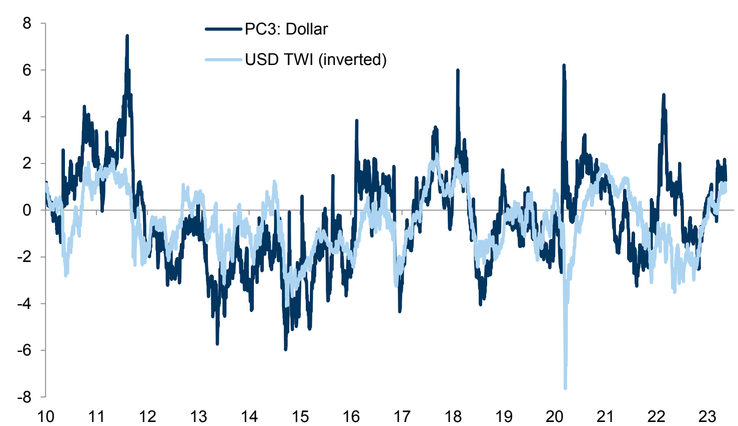
Source: Datastream, Goldman Sachs Global Investment Research

Exhibit 17: PC2: Monetary policy factor vs. US 10-year TIPS yield



Source: Datastream, Goldman Sachs Global Investment Research

Exhibit 18: PC3: Dollar factor vs. USD TWI



Source: Datastream, Goldman Sachs Global Investment Research

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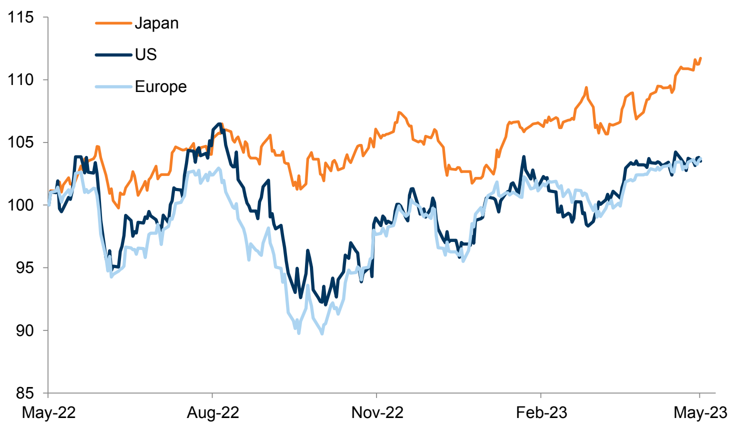
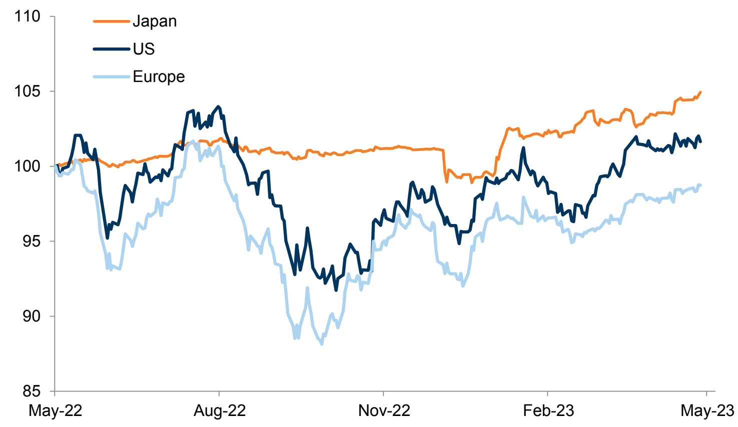
Cross-asset: Balanced portfolios and dynamic allocation strategies performance

Exhibit 19: 60/40 equity/bond portfolio performance across regions last 12m
Relative total return performance indexed to 100 12m ago



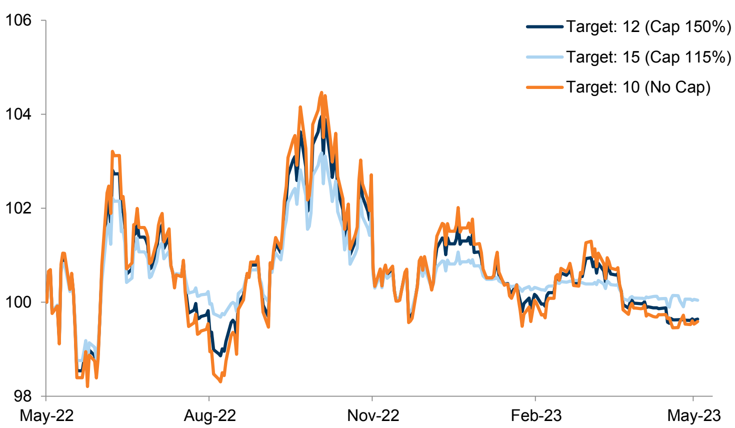
Source: Datastream, Goldman Sachs Global Investment Research

Exhibit 20: Risk parity portfolio performance across regions last 12m
Weighted inversely by 3m realised volatility of equity and 10y bonds



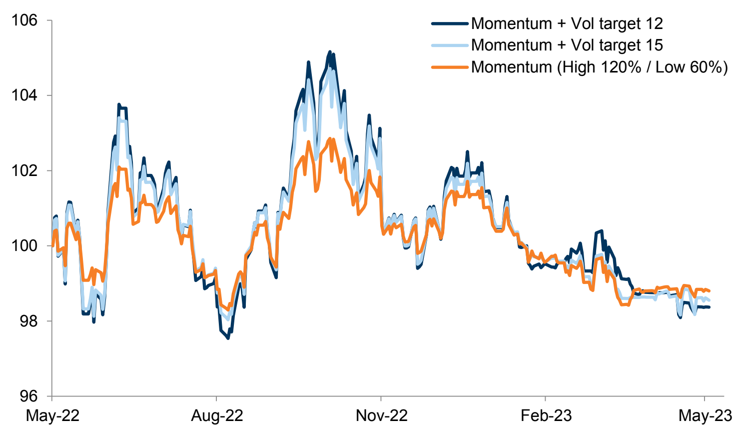
Source: Datastream, Goldman Sachs Global Investment Research

Exhibit 21: 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 22: 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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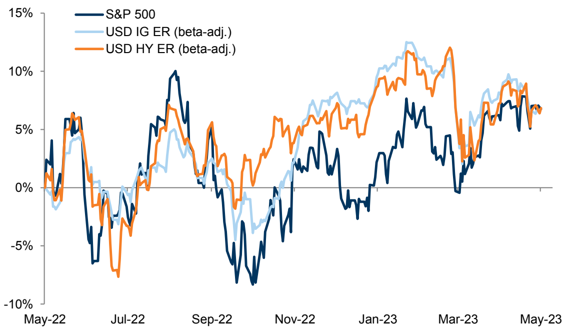
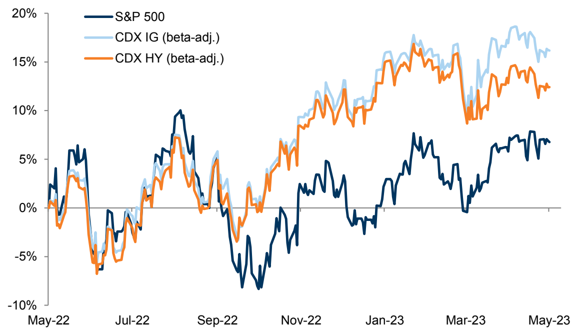
Cross-asset: Equity vs. credit monitor

Exhibit 23: USD cash credit vs. US equity
Cash credit excess returns (beta-adjusted) vs. S&P 500 total returns



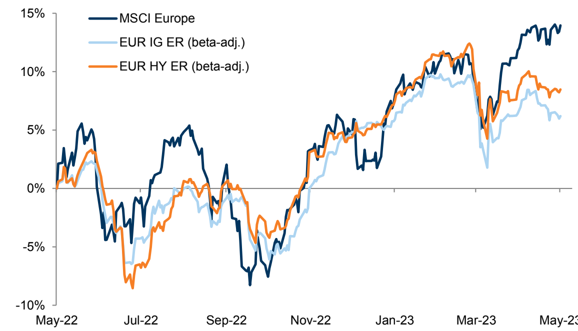
Source: Datastream, Goldman Sachs Global Investment Research

Exhibit 24: USD synthetic credit vs. US equity
Synthetic credit excess returns (beta-adjusted) vs. S&P 500 total returns



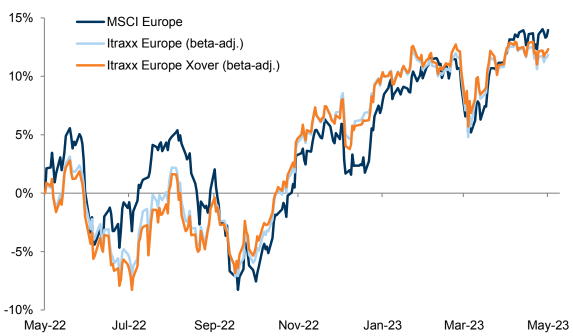
Source: Datastream, Goldman Sachs Global Investment Research

Exhibit 25: EUR cash credit vs. European equity
Cash credit excess returns (beta-adjusted) vs. MSCI Europe total returns



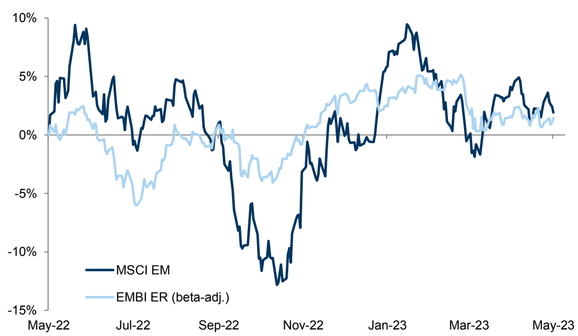
Source: Datastream, Goldman Sachs Global Investment Research

Exhibit 26: EUR synthetic credit vs. European equity
Synthetic credit excess returns (beta-adjusted) vs. MSCI Europe total returns



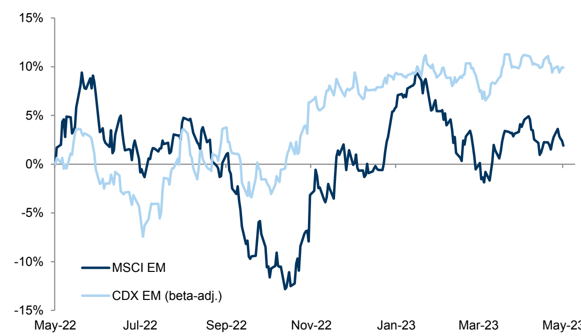
Source: Datastream, Goldman Sachs Global Investment Research

Exhibit 27: 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 28: 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: Valuation and risk premia

Exhibit 29: Cross-asset valuation table

A higher percentile means more expensive relative to 10y history

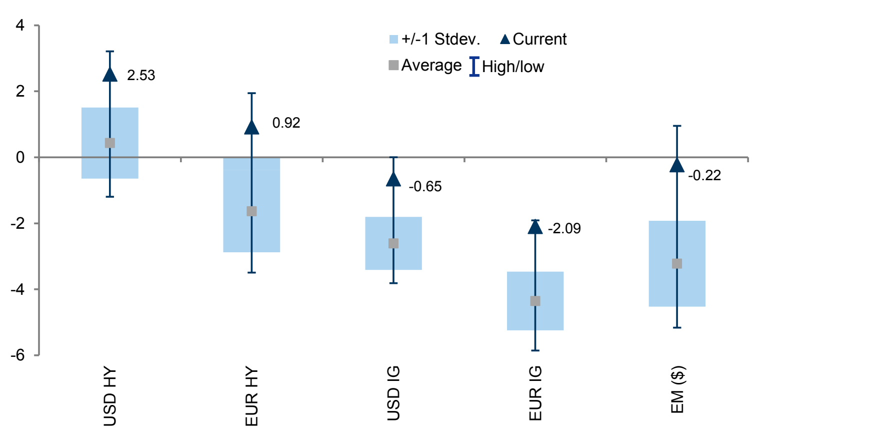
	Equity					Government bonds				Credit					FX	
	S&P 500	Stoxx 600	MXAPJ	Topix	MSCI EM	US 10y	German 10y	Japan 10y	UK 10y	US IG	US HY	EUR IG	EUR HY	EM ($)	EUR/USD	USD/JPY
Valuation metric	**12m forward P/E ratio**					**Yield**				**Spread**					**Actual - GS fair value**	
Current:	18.1x	12.7x	13.0x	13.3x	11.7x	3.5%	2.3%	0.4%	3.8%	158bp	476bp	182bp	484bp	484bp	-0.12 €/$	41.4 $/¥
Expensiveness (last 10y percentile):	***73%***	***13%***	***51%***	***36%***	***47%***	***5%***	***3%***	***22%***	***1%***	***25%***	***30%***	***10%***	***20%***	***9%***	***59%***	***2%***
3M change:	-0.2x	-0.1x	-0.5x	0.7x	-0.4x	-0.3%	-0.1%	-0.1%	0.4%	21bp	52bp	24bp	75bp	39bp	0.03 €/$	5.2 $/¥
Average:	17.5x	14.5x	13.1x	13.9x	11.9x	2.2%	0.5%	0.2%	1.5%	145bp	447bp	134bp	404bp	-15bp	-0.11 €/$	16.0 $/¥
95th:	22.1x	17.4x	16.2x	17.3x	14.8x	3.5%	2.1%	0.7%	3.3%	192bp	693bp	203bp	583bp	509bp	0.12 €/$	38.1 $/¥
5th:	14.5x	12.0x	11.4x	12.0x	10.1x	0.7%	-0.5%	-0.1%	0.3%	102bp	324bp	96bp	279bp	281bp	-0.22 €/$	-0.2 $/¥

Note: 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 30: Credit spread minus equity risk premium estimates across markets

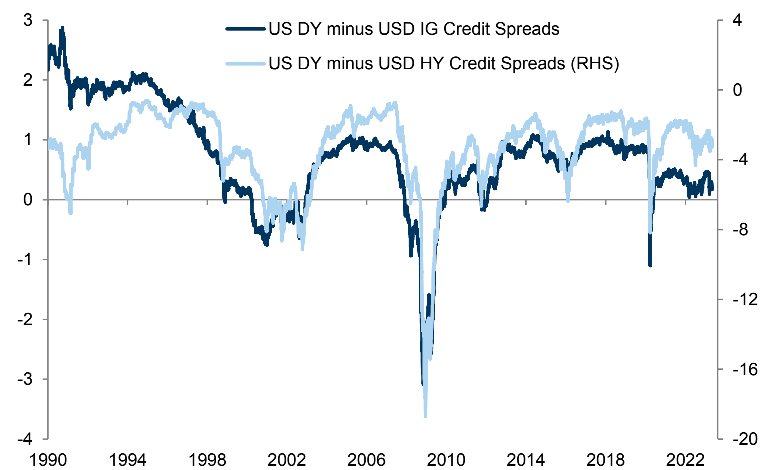
Equity risk premia based on 1-stage DDM using local 10-year yields and LT GDP consensus estimates. Using past 10 years of data.



Source: Datastream, iBoxx, Goldman Sachs Global Investment Research

Exhibit 31: Equity vs. credit relative valuation

US Dividend Yield minus Credit spreads



Source: Datastream, Goldman Sachs Global Investment Research

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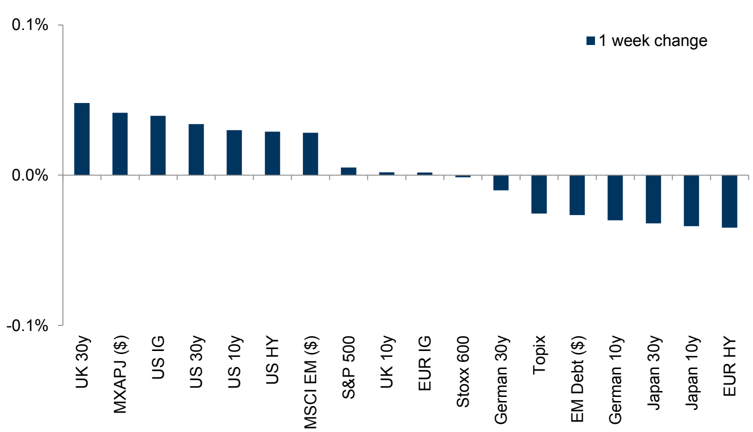
Cross-asset: Yields

Exhibit 32: Current yields across assets and their percentile to the past 10 years

	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 ($)
Valuation metric	Dividend Yield (NTM)					Yield				Yield				
Current:	1.7%	3.6%	3.1%	2.5%	3.2%	3.5%	2.3%	0.4%	3.8%	5.0%	4.1%	8.6%	7.4%	8.3%
Percentile (-10y):	*21%*	*39%*	*47%*	*77%*	*79%*	*96%*	*97%*	*77%*	*99%*	*98%*	*98%*	*94%*	*98%*	*97%*
Average:	2.0%	3.6%	3.1%	2.3%	3.0%	2.2%	0.5%	0.2%	1.6%	2.8%	1.2%	6.7%	4.4%	5.9%
95th:	2.3%	4.1%	3.5%	2.7%	3.4%	3.4%	2.1%	0.7%	3.3%	4.9%	4.0%	8.7%	7.2%	8.2%
5th:	1.5%	3.0%	2.4%	1.9%	2.5%	0.8%	-0.5%	-0.1%	0.3%	1.3%	0.3%	4.8%	3.0%	4.7%
3m real. ret. vol:	15.0%	13.4%	14.1%	13.7%	12.8%	11.2%	12.0%	4.0%	9.8%	7.9%	5.2%	5.6%	3.4%	5.5%
Percentile (-10y):	*59%*	*51%*	*29%*	*54%*	*35%*	*96%*	*95%*	*94%*	*89%*	*86%*	*89%*	*79%*	*70%*	*72%*
Yield/vol ratio	0.12	0.27	0.22	0.19	0.25	0.31	0.19	0.10	0.39	0.63	0.78	1.54	2.16	1.52

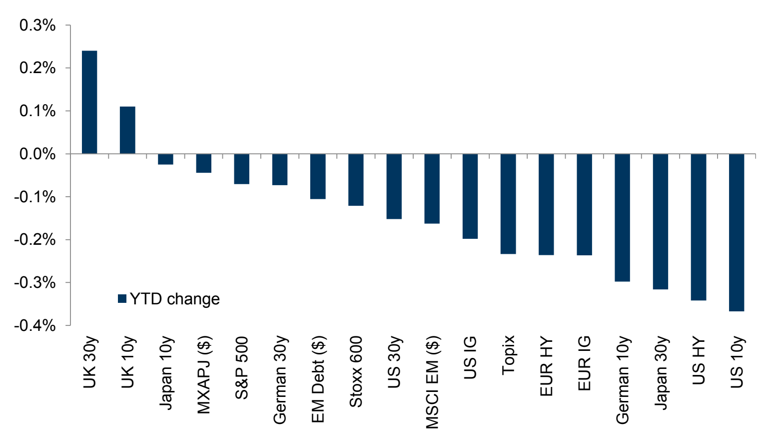
Source: Datastream, iBoxx, Goldman Sachs Global Investment Research

Exhibit 33: Past week change in yields across assets



Source: Datastream, iBoxx, Goldman Sachs Global Investment Research

Exhibit 34: YTD change in yields across assets



Source: Datastream, iBoxx, Goldman Sachs Global Investment Research

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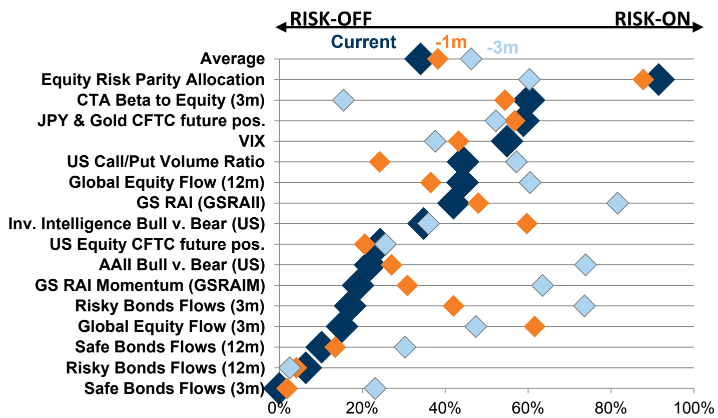
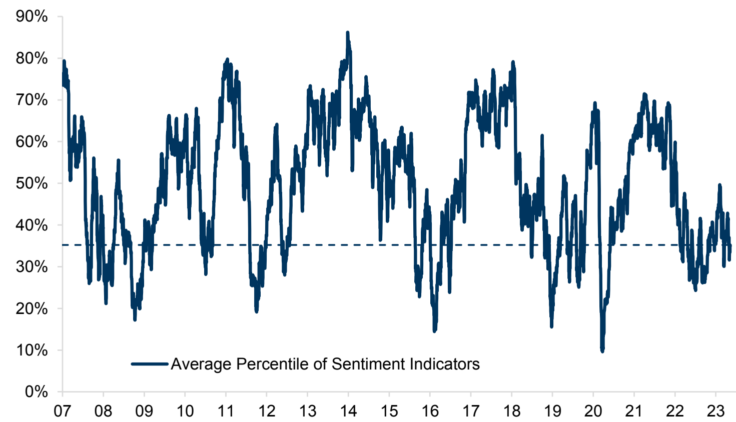
Cross-asset: Sentiment and Positioning

Exhibit 35: Percentile of sentiment indicators
Data since 2007



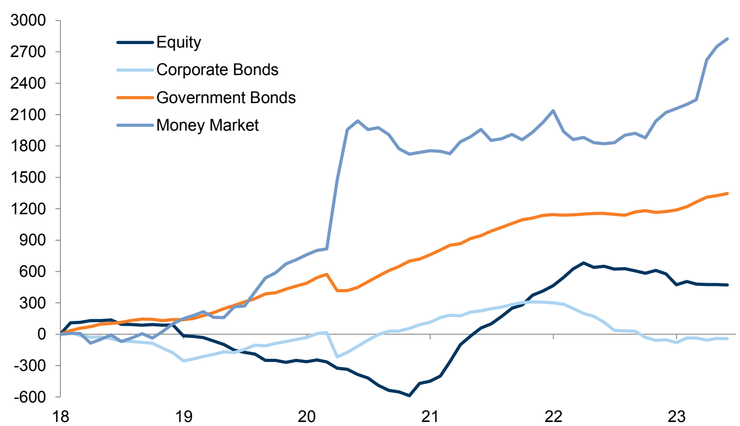
Source: Datastream, Haver Analytics, EPFR, Goldman Sachs Global Investment Research

Exhibit 36: Average percentile of sentiment indicators
Data since 2007



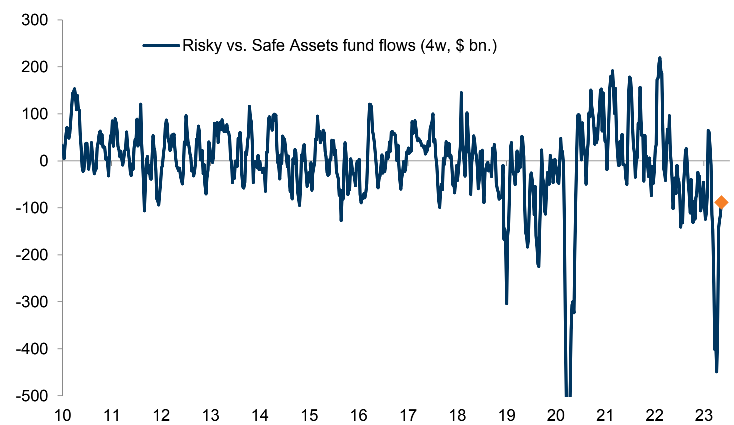
Source: Datastream, Haver Analytics, EPFR, Goldman Sachs Global Investment Research

Exhibit 37: Cumulative fund flows across assets
Monthly flows ($bn). MTD sum of weekly flows when monthly not yet available



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

Exhibit 38: Risky vs. safe assets fund flows
4 weeks rolling flows, USD bn



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

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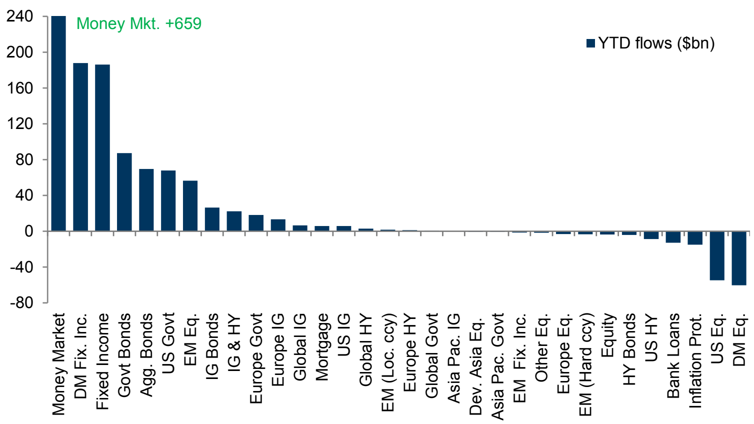
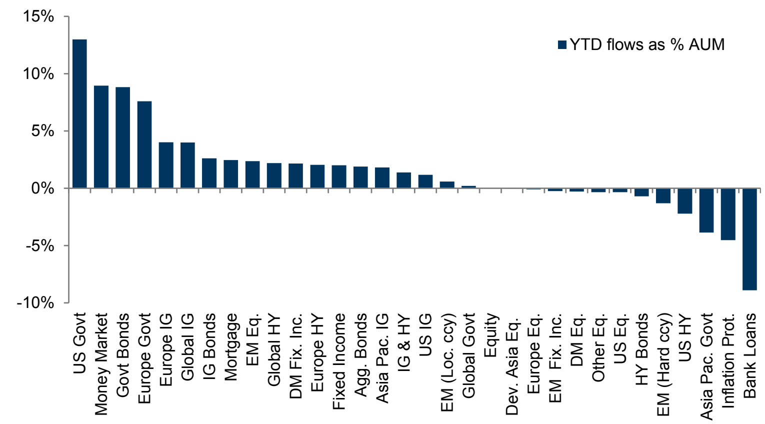
Cross-asset: Global Funds Flows

Exhibit 39: YTD cross-asset global fund flows
All funds reporting weekly. $ Bn



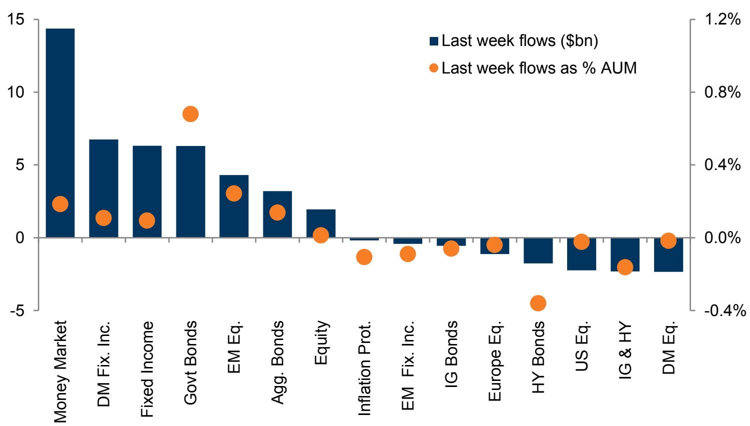
Source: EPFR, Goldman Sachs Global Investment Research

Exhibit 40: YTD cross-asset global fund flows
All funds reporting weekly. % of AUM



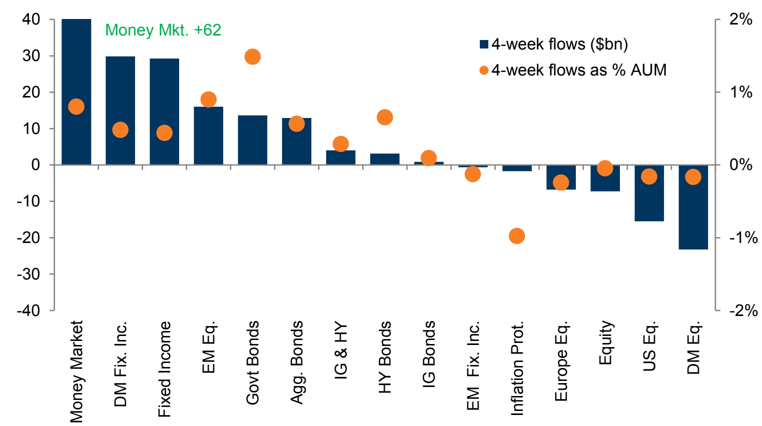
Source: EPFR, Goldman Sachs Global Investment Research

Exhibit 41: 1-week cross-asset global fund flows
All funds reporting weekly



Source: EPFR, Goldman Sachs Global Investment Research

Exhibit 42: 4-week cross-asset global fund flows
All funds reporting weekly



Source: EPFR, Goldman Sachs Global Investment Research

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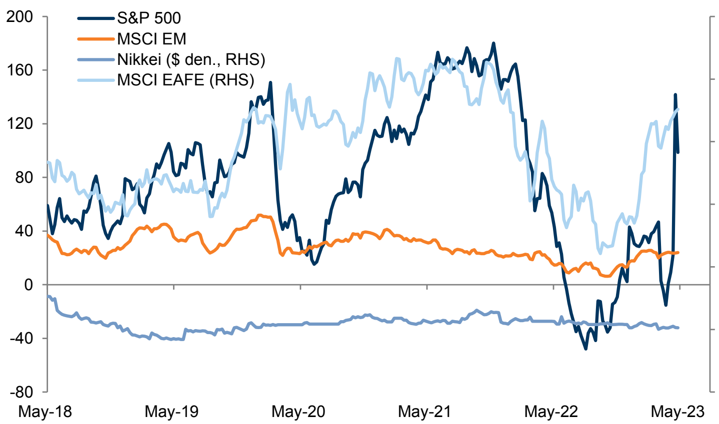
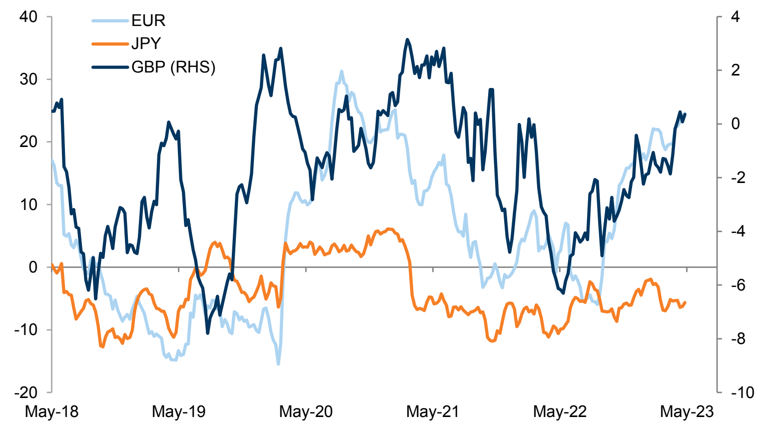
Cross-asset: CFTC positioning

Exhibit 43: Equity net long positioning
Leveraged funds and asset managers net future positions ($ bn)



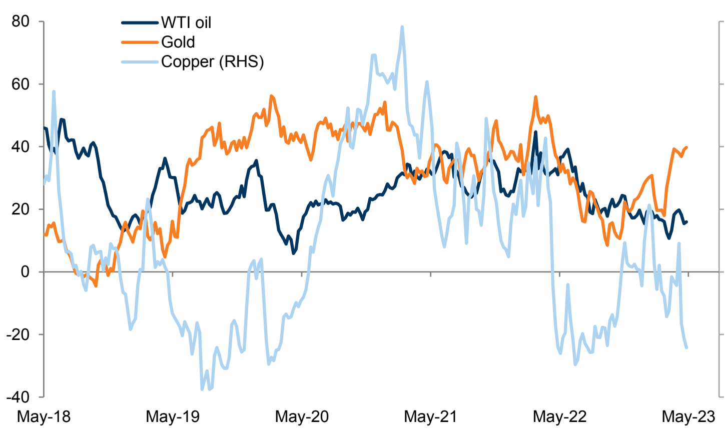
Source: Bloomberg, CFTC, Goldman Sachs Global Investment Research

Exhibit 44: Currency net long positioning
Net non-commercial positions ($ bn)



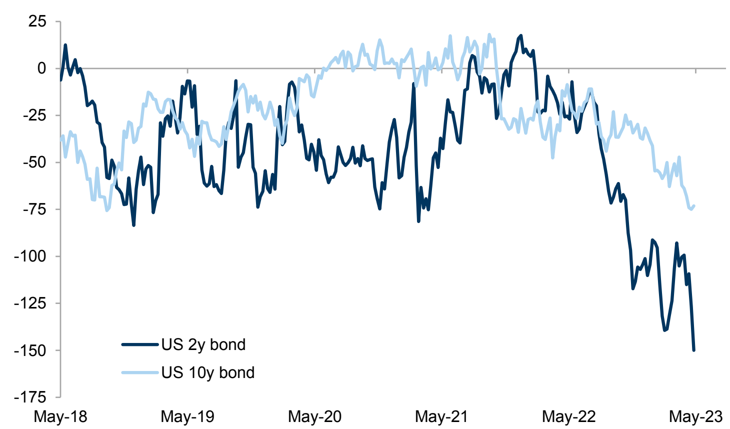
Source: Bloomberg, CFTC, Goldman Sachs Global Investment Research

Exhibit 45: Commodity net long positioning
Net non-commercial positions ($ bn)



Source: Bloomberg, CFTC, Goldman Sachs Global Investment Research

Exhibit 46: US Treasury net long positioning
Net non-commercial positions ($ bn)



Source: Bloomberg, CFTC, Goldman Sachs Global Investment Research

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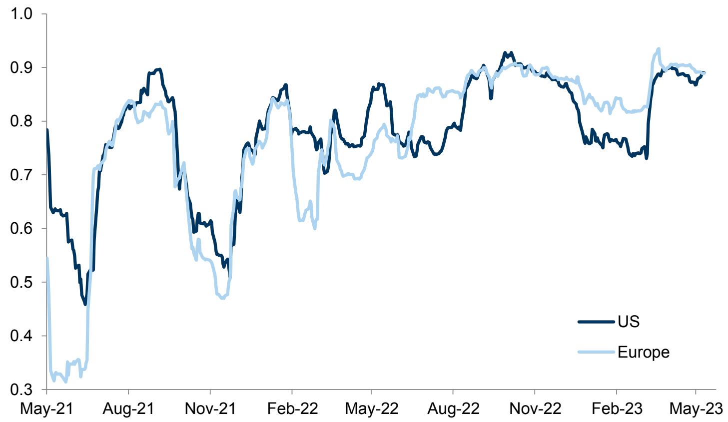
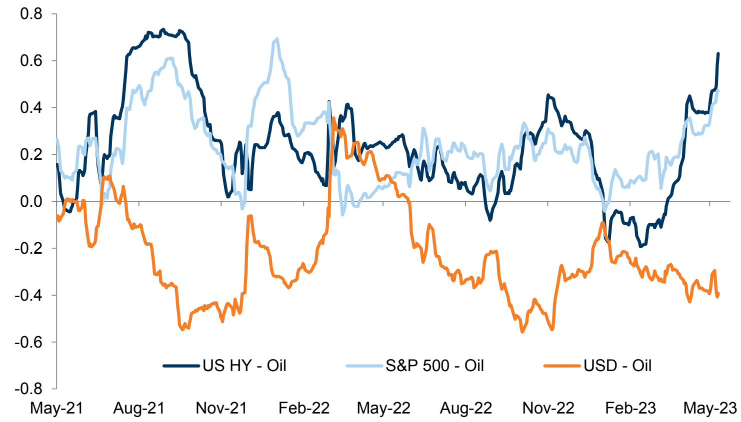
Cross-asset: Correlations: Equity vol/CDS, commodity prices/credit & FX, equity/bond, equity/FX

Exhibit 47: 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



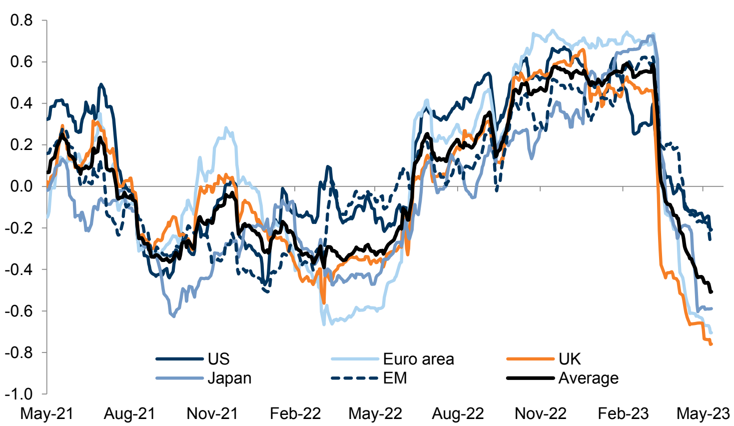
Source: Datastream, Goldman Sachs, Goldman Sachs Global Investment Research

Exhibit 48: 3m rolling commodity price correlations of weekly % changes with different assets



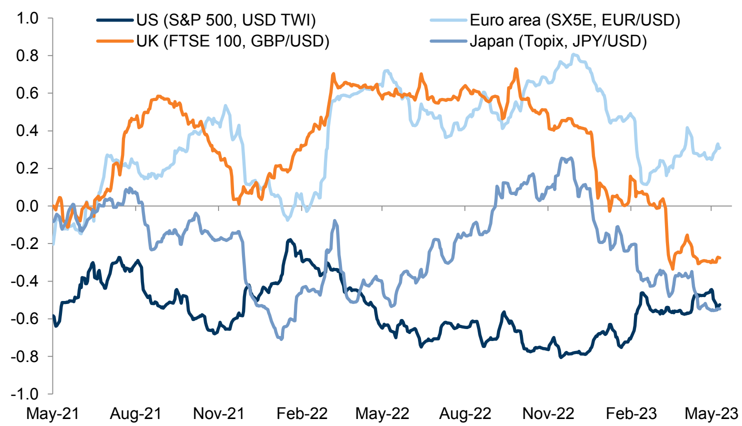
Source: Datastream, Goldman Sachs, Goldman Sachs Global Investment Research

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



Source: Datastream, Goldman Sachs Global Investment Research

Exhibit 50: 3m rolling equity/FX correlation of weekly returns



Source: Datastream, Goldman Sachs Global Investment Research

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Cross-asset: Correlation matrix

Exhibit 51: 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.

Current 1y correlation of weekly 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 ($)	WTI Crude Oil	Copper	Gold	VIX
S&P 500		0.79	0.51	0.45	0.51	0.29	0.34	0.00	0.44	0.50	-0.35	0.63	0.54	0.54	0.83	0.66	0.64	0.26	0.25	0.32	-0.30
STOXX 600	0.40		0.57	0.51	0.58	0.28	0.32	-0.15	0.39	0.44	-0.29	0.58	0.56	0.60	0.80	0.76	0.61	0.29	0.43	0.19	-0.34
MXAPJ	0.25	0.29		0.51	0.98	0.29	0.14	0.02	0.16	0.53	-0.47	0.75	0.53	0.42	0.54	0.63	0.61	0.24	0.57	0.64	-0.30
TOPIX	0.16	0.21	0.20		0.50	-0.02	-0.12	0.13	-0.03	0.27	0.04	0.46	0.31	0.20	0.50	0.62	0.34	0.26	0.21	0.06	-0.33
MSCI EM	0.20	0.23	0.81	0.24		0.23	0.09	-0.02	0.13	0.51	-0.44	0.74	0.49	0.37	0.55	0.62	0.59	0.32	0.64	0.63	-0.31
US 10 yr	1.00	0.99	0.96	0.99	0.95		0.86	0.37	0.73	0.42	-0.53	0.25	0.82	0.76	0.37	0.34	0.61	-0.08	0.06	0.42	-0.09
Germany 10 yr	0.99	0.99	0.97	0.81	0.94	0.97		0.33	0.82	0.23	-0.46	0.19	0.68	0.88	0.37	0.34	0.53	-0.18	-0.12	0.29	-0.05
Japan 10 yr	0.77	0.55	0.70	0.95	0.63	0.20	0.17		0.27	-0.01	0.03	0.00	0.22	0.22	0.03	0.04	0.19	-0.21	-0.05	0.21	0.04
UK 10 yr	0.99	1.00	0.97	0.92	0.96	0.31	0.37	0.11		0.36	-0.41	0.25	0.66	0.76	0.39	0.40	0.54	-0.09	-0.05	0.19	-0.04
EUR/USD	0.93	0.95	0.89	0.78	0.81	0.93	0.79	0.41	0.91		-0.53	0.63	0.55	0.39	0.49	0.46	0.60	0.21	0.43	0.56	-0.16
USD/JPY	0.04	0.01	0.07	0.25	0.06	0.45	0.40	0.88	0.56	0.27		-0.54	-0.59	-0.54	-0.32	-0.44	-0.58	-0.17	-0.37	-0.60	0.12
AUD/USD	0.75	0.74	0.72	0.69	0.75	0.88	0.88	0.61	0.92	0.62	0.11		0.54	0.41	0.61	0.63	0.59	0.15	0.44	0.57	-0.26
iBoxx US IG	0.95	1.00	0.94	0.95	0.94	0.44	0.50	0.15	0.51	0.94	0.12	0.95		0.79	0.70	0.67	0.84	0.02	0.17	0.37	-0.26
iBoxx EUR IG	0.94	0.99	0.86	0.69	0.84	0.93	0.72	0.32	0.77	0.86	0.05	0.86	0.72		0.62	0.68	0.74	-0.02	0.08	0.30	-0.26
BAML US HY	0.95	0.99	0.39	0.63	0.40	0.87	0.93	0.58	0.95	0.91	0.14	0.79	0.93	0.86		0.80	0.79	0.20	0.28	0.29	-0.34
BAML EUR HY	0.91	0.96	0.66	0.83	0.68	0.97	0.96	0.68	0.99	0.90	0.03	0.86	0.95	0.88	0.47		0.76	0.19	0.39	0.28	-0.45
EM Credit ($)	0.85	0.78	0.63	0.62	0.50	0.88	0.96	0.53	0.96	0.93	0.02	0.77	0.94	0.94	0.93	0.91		0.17	0.36	0.47	-0.37
WTI Crude Oil	0.59	0.60	0.52	0.67	0.63	0.56	0.40	0.18	0.57	0.61	0.18	0.29	0.54	0.35	0.47	0.57	0.44		0.40	0.17	-0.10
Copper	0.36	0.68	0.77	0.37	0.84	0.89	0.65	0.64	0.81	0.82	0.03	0.48	0.87	0.75	0.48	0.79	0.76	0.71		0.51	-0.20
Gold	0.88	0.79	1.00	0.69	1.00	0.82	0.74	0.66	0.50	0.76	0.14	0.73	0.78	0.74	0.78	0.88	0.81	0.49	0.86		-0.17
VIX	0.70	0.63	0.53	0.52	0.51	0.07	0.07	0.24	0.11	0.34	0.86	0.25	0.05	0.17	0.49	0.25	0.10	0.62	0.58	0.21	

Current correlation's percentile since 2001

Current correlation's percentile since 2001

Current 1y correlation of weekly returns

Source: Datastream, iBoxx, Goldman Sachs Global Investment Research

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

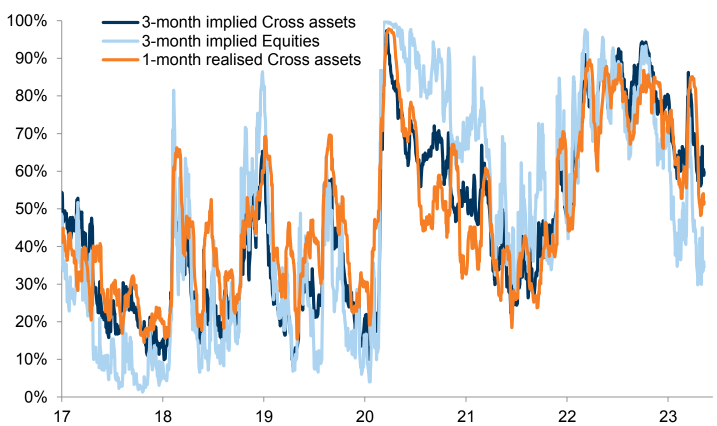
Exhibit 52: Cross-asset volatility, current and historical percentiles, implied 3m and realised 1m

	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:	15.5	15.5	15.3	12.2	16.4	14.4	10.7	7.2	7.3	6.1	50.2	48.8	55.7	38.8	15.7	24.3	7.4	10.3	8.0
Percentile:	*59%*	*32%*	*17%*	*26%*	*16%*	*44%*	*98%*	*91%*	*91%*	*90%*	*59%*	*65%*	*59%*	*67%*	*62%*	*70%*	*50%*	*72%*	*43%*
1M change:	-1.4	-1.1	-1.2	-0.3	-0.8	-0.8	0.6	0.1	-1.1	-0.4	-2.4	-3.8	-1.3	4.9	-0.6	-0.6	-0.1	-0.5	-0.5
Average:	16.0	18.3	19.5	15.0	20.1	15.6	3.8	4.9	2.3	3.7	50.4	46.0	53.9	35.0	14.8	21.7	7.7	8.8	8.9
95th:	25.2	26.1	26.7	22.6	26.7	22.6	9.3	7.8	8.5	7.7	69.7	65.7	70.2	54.5	20.4	29.7	11.3	12.9	13.0
5th:	10.0	12.3	13.8	10.3	15.3	10.4	1.3	3.5	0.9	2.2	38.7	30.7	38.7	17.1	9.7	15.2	5.1	5.6	6.1
Realised (%)																			
1-month:	13.4	9.5	9.8	8.3	9.3	7.4	11.7	7.4	5.9	5.5	33.4	27.7	35.5	38.4	17.9	19.7	6.8	10.7	7.8
Percentile:	*55%*	*10%*	*6%*	*14%*	*15%*	*12%*	*99%*	*91%*	*92%*	*87%*	*42%*	*42%*	*40%*	*64%*	*83%*	*54%*	*42%*	*76%*	*42%*
Average:	15.0	17.7	19.4	14.3	14.7	13.1	3.6	4.8	1.8	3.4	40.3	34.4	43.3	38.4	14.3	19.9	7.7	8.5	8.9

Source: Goldman Sachs, Goldman Sachs Global Investment Research

Exhibit 53: 10y percentile for cross-asset average volatility

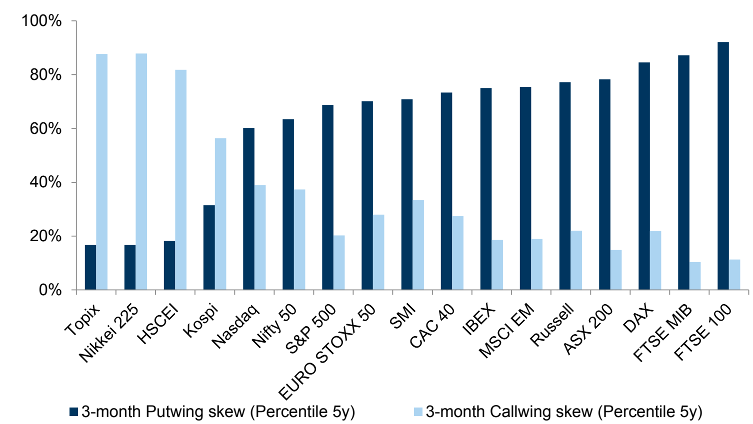
Using 16 assets across equity, government bonds, credit, commodities and FX



Source: Goldman Sachs, Goldman Sachs Global Investment Research

Exhibit 54: 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

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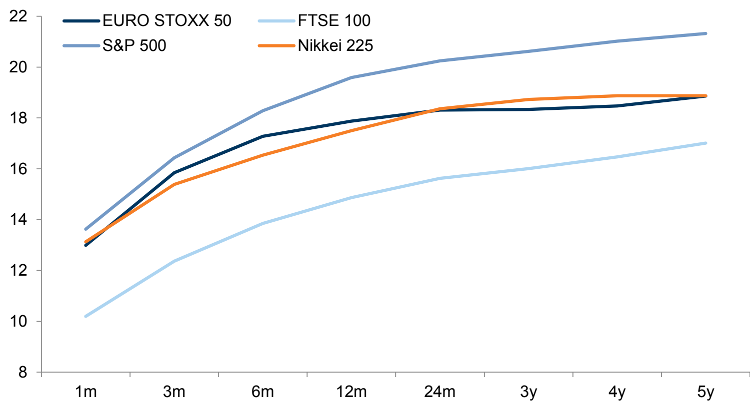
Cross-asset: Volatility, skew, CDS with equity vol, rate vol

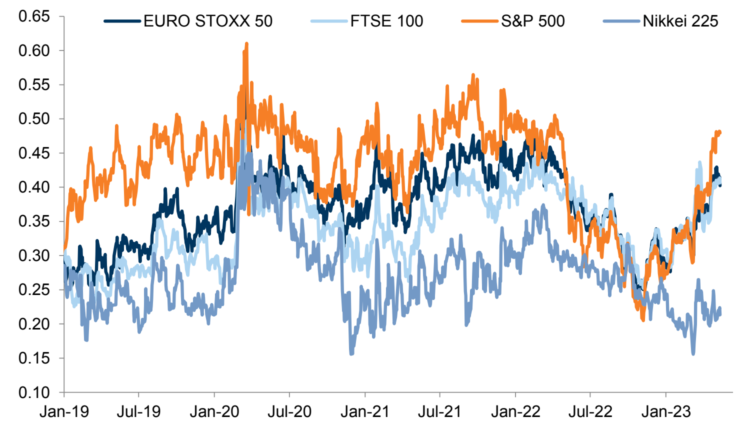
Exhibit 55: ATM implied volatility term structure for equity indices



Source: Goldman Sachs, Goldman Sachs Global Investment Research

Exhibit 56: Normalised implied volatility skew across regions

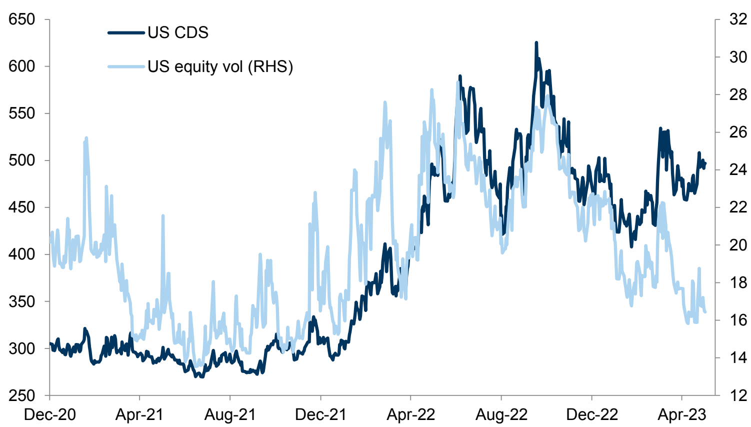
3m 25 delta put vol minus 25 delta call vol scaled by ATM implied vol



Source: Goldman Sachs, Goldman Sachs Global Investment Research

Exhibit 57: CDS and equity vol levels in the US

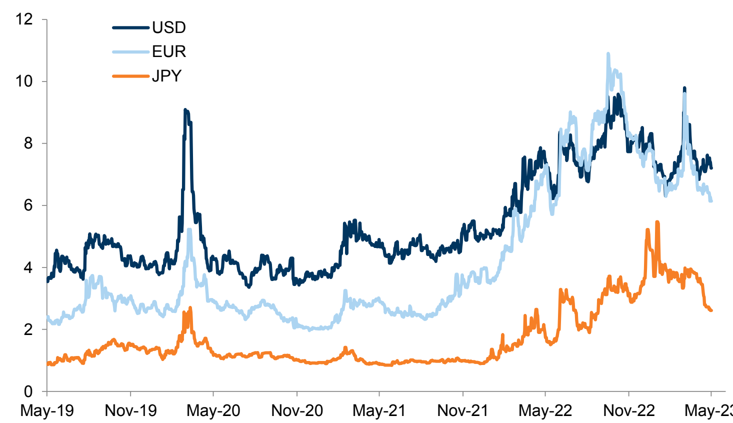
CDX HY, 3m ATM S&P 500 implied vol



Source: Goldman Sachs, Goldman Sachs Global Investment Research

Exhibit 58: 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

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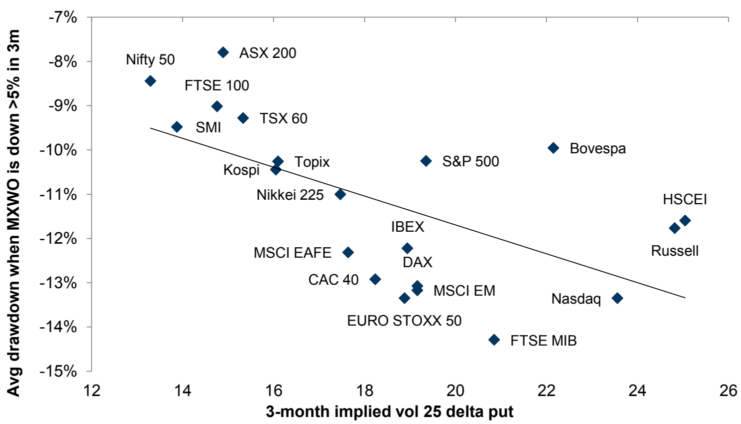
Cross-asset: Alternatives and option strategies

Exhibit 59: Implied volatility (3-month 25 delta put) vs. average drawdown during MXWO corrections

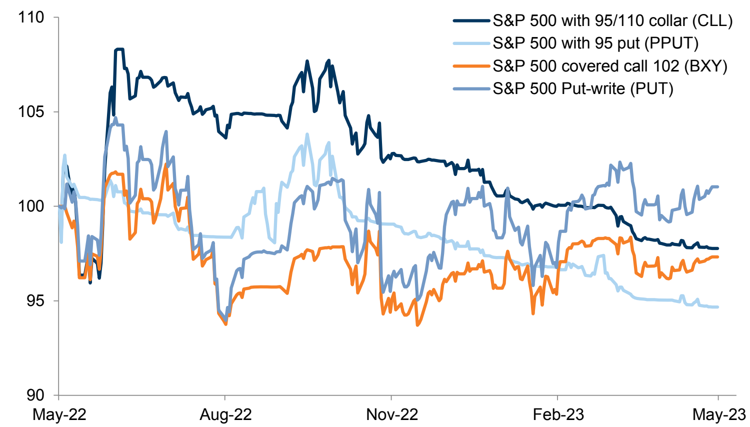
3m put 25 delta put option implied vol vs. average performance during a 5% MXWO drawdown



Source: Goldman Sachs Global Investment Research

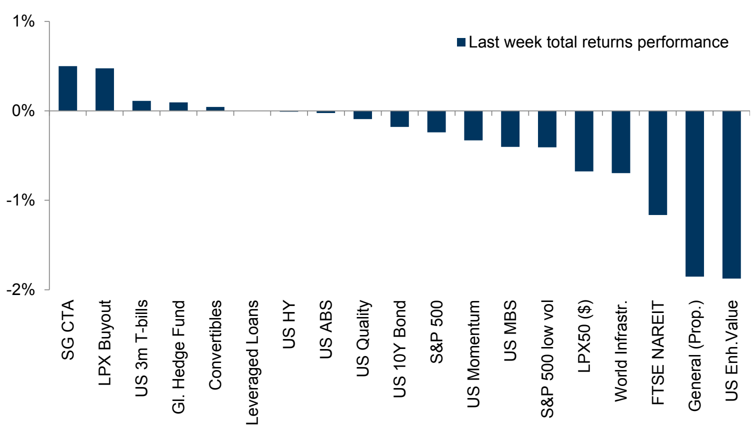
Exhibit 60: Systematic option strategies vs. S&P 500 performance

CBOE Strategies vs. S&P 500 performance



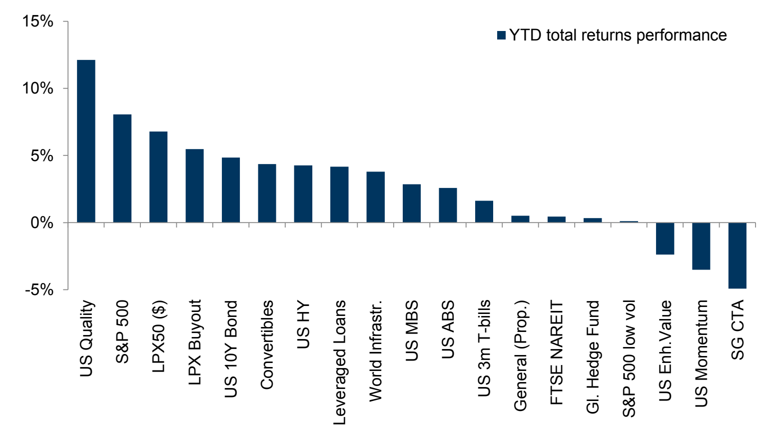
Source: Bloomberg, Goldman Sachs Global Investment Research

Exhibit 61: Last week performance of alternative assets or strategies



Source: Bloomberg, Datastream, Goldman Sachs Global Investment Research

Exhibit 62: YTD performance of alternative assets or strategies



Source: Bloomberg, Datastream, Goldman Sachs Global Investment Research

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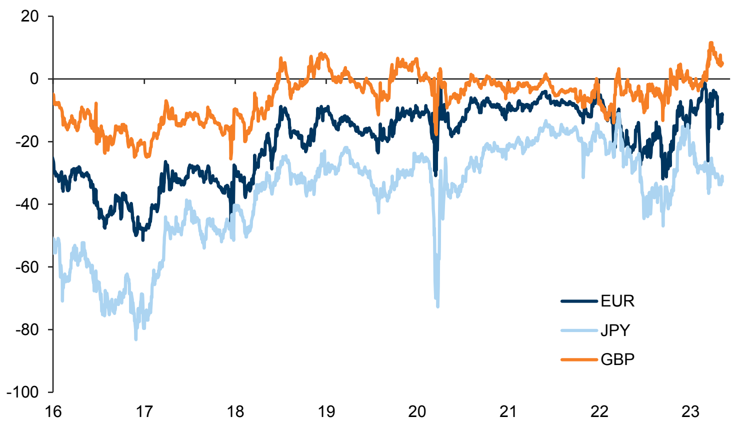
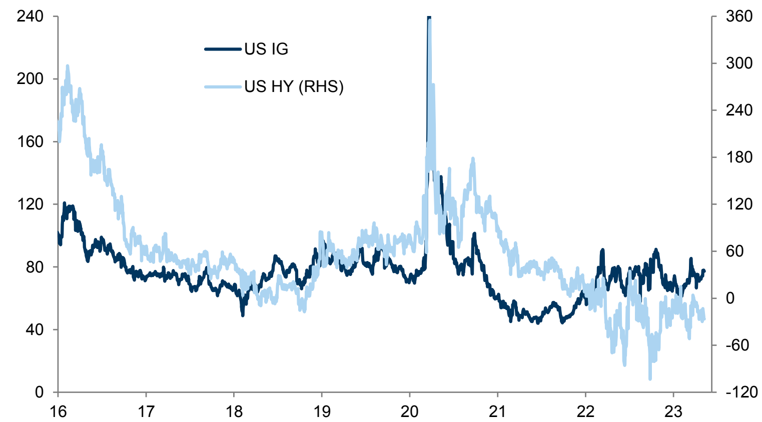
Cross-asset: Liquidity indicators

Exhibit 63: 1-year cross-currency basis
Basis points



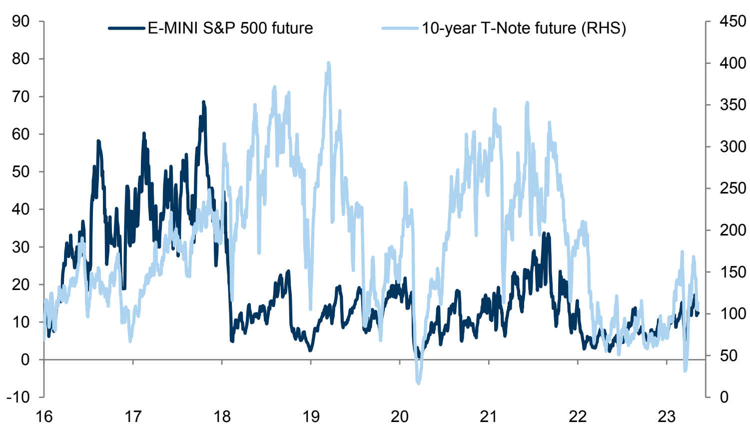
Source: Goldman Sachs Group Inc., Goldman Sachs Global Investment Research

Exhibit 64: Cash credit versus CDS spread
Basis points



Source: Goldman Sachs Group Inc., Haver Analytics, Goldman Sachs Global Investment Research

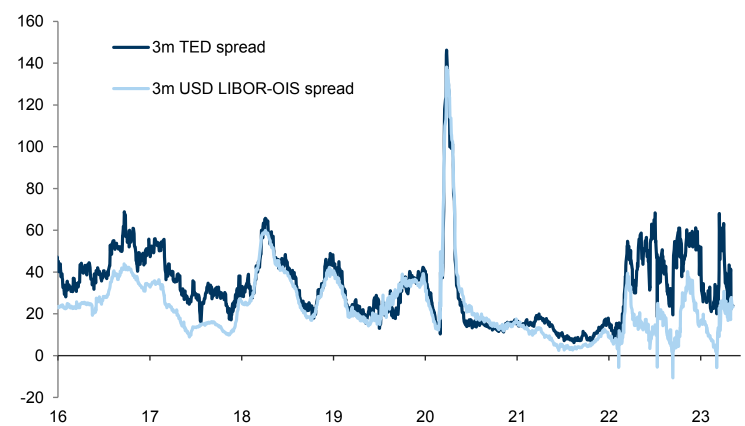
Exhibit 65: Top-of-book depth
5-day average, $ mln



E-MINI S&P 500 = 5d avg. # of contracts * S&P 500 price * $50. 10-year T-note = 5d avg. # of contracts * $100,000

Source: Goldman Sachs Group Inc., Bloomberg, Goldman Sachs Global Investment Research

Exhibit 66: Interbank spread
Basis points



TED spread = 3m USD LIBOR rate - 3m T-bill rate

Source: Bloomberg, Goldman Sachs Global Investment Research

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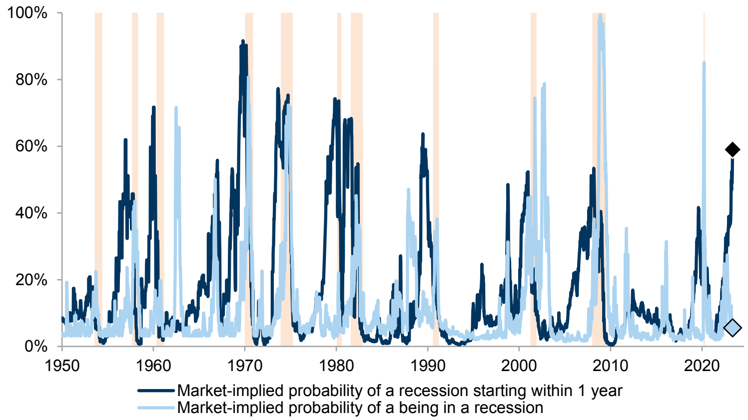
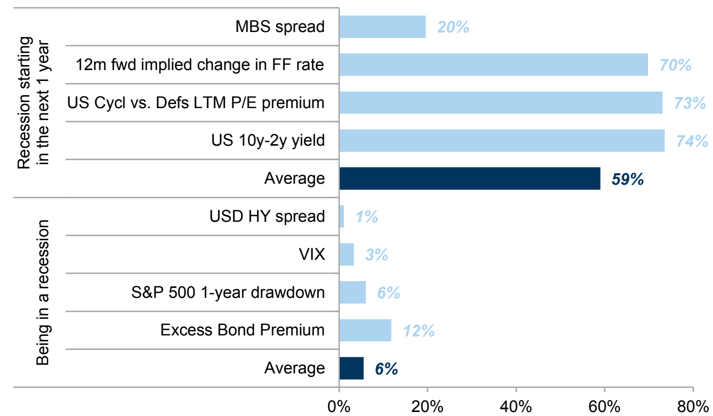
Cross-asset: Market pricing of US recession risk

Exhibit 67: Market-implied US recession probability
Average of univariate logit models on the right. Orange shade: NBER recession



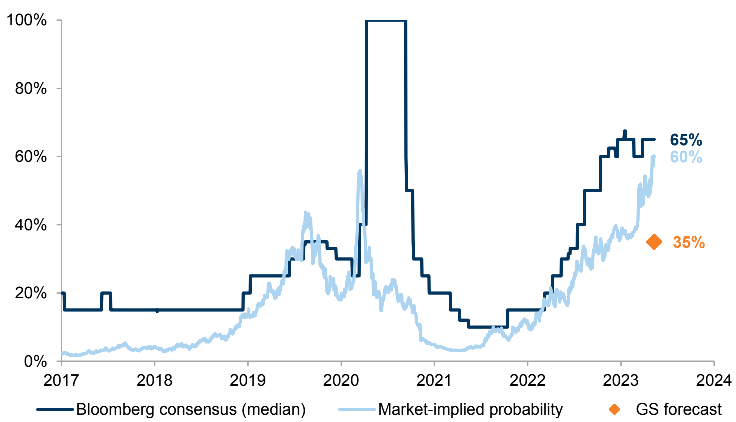
Source: Haver Analytics, Datastream, Worldscope, Goldman Sachs Global Investment Research

Exhibit 68: Market-implied US recession probability by indicator
Univariate logit models. Maximum history since 1950



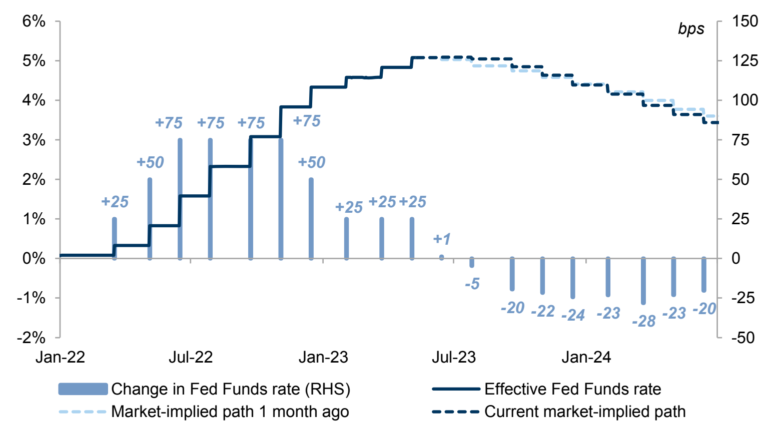
Source: Haver Analytics, Datastream, Worldscope, Goldman Sachs Global Investment Research

Exhibit 69: Probability of a US recession in the next 1 year



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

Exhibit 70: Market-implied path of the Fed Funds rate
Based on 30-day Fed Funds futures



Source: Haver Analytics, Goldman Sachs Global Investment Research

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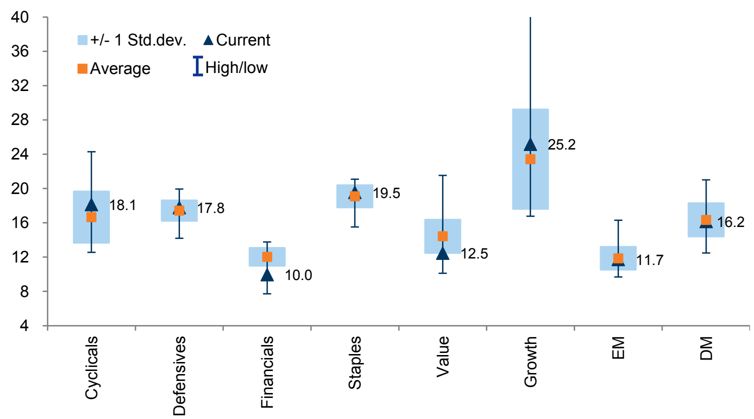
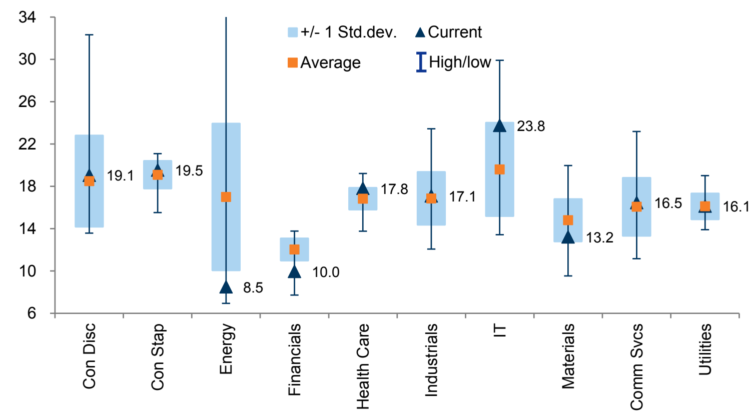
Equity: Valuation and styles

Exhibit 71: Valuation ranges of MSCI World styles indices
12-month forward P/Es relative to the last 10 years



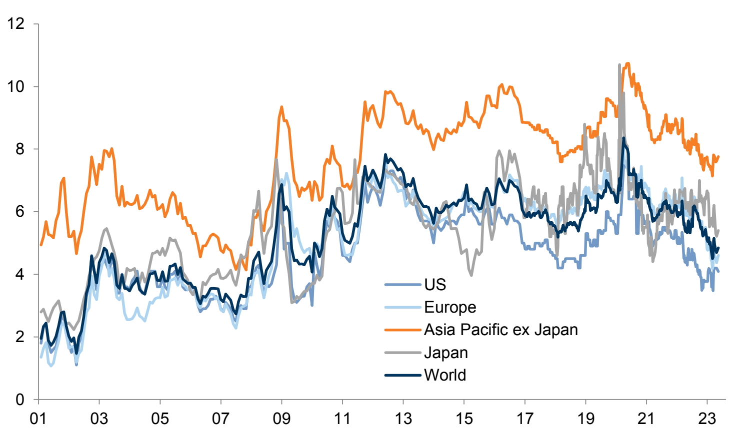
Source: Datastream, I/B/E/S, Goldman Sachs Global Investment Research

Exhibit 72: MSCI World sector valuations
12-month forward P/Es relative to the last 10 years



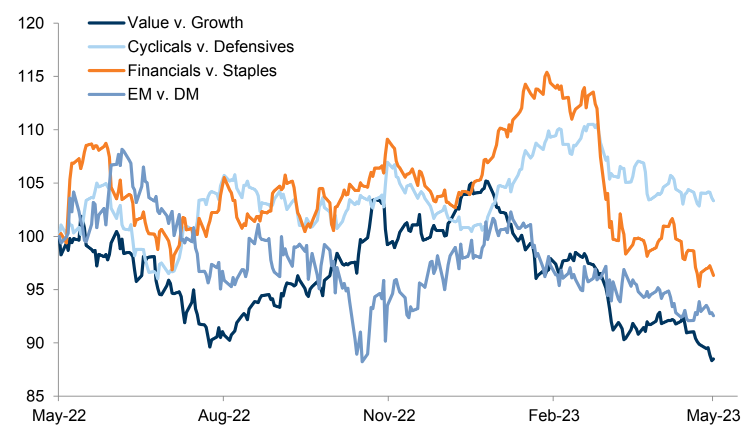
Source: Datastream, I/B/E/S, Goldman Sachs Global Investment Research

Exhibit 73: 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 74: MSCI World style index performance
Performance indexed to 100 12m ago



Source: Datastream, Goldman Sachs Global Investment Research

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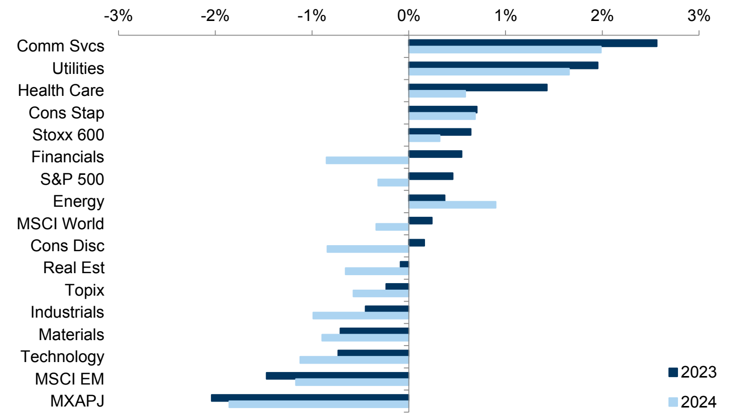
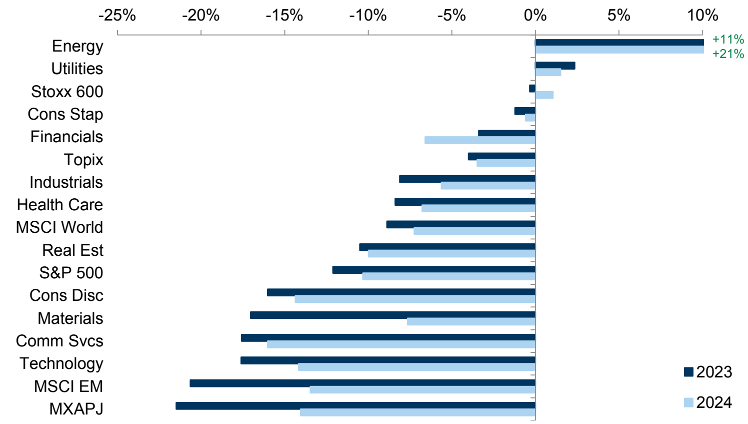
Equity: Earnings

Exhibit 75: 1-month revision to I/B/E/S consensus earnings
MSCI World sectors, other global equity index aggregates. TOPIX: FY 2022/2023



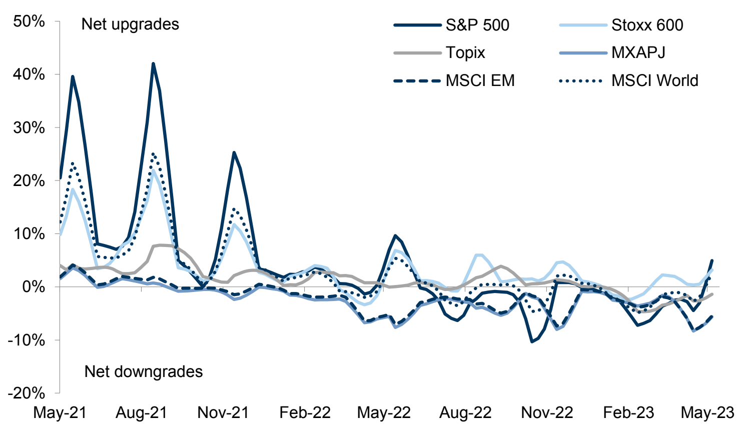
Source: Datastream, I/B/E/S, Goldman Sachs Global Investment Research

Exhibit 76: 12-month revision to I/B/E/S consensus earnings
MSCI World sectors, other global equity index aggregates. TOPIX: FY 2022/2023



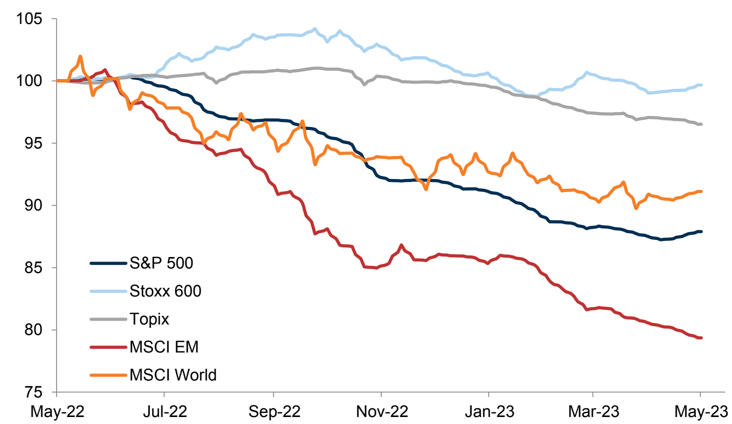
Source: Datastream, I/B/E/S, Goldman Sachs Global Investment Research

Exhibit 77: 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 78: 2023 consensus earnings expectations over the past 12 months
Earnings indexed to 100 12 months ago. TOPIX: FY 2023



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

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Government bonds: Yield curves

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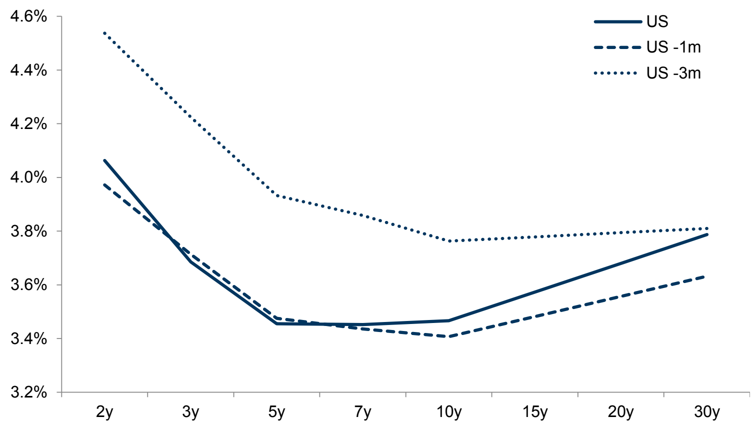
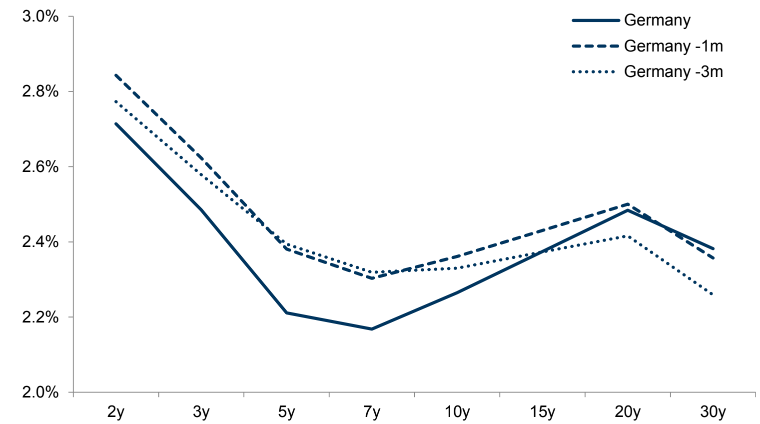
Exhibit 79: US yield curve dynamics
Current relative to 1 month and 3 months ago



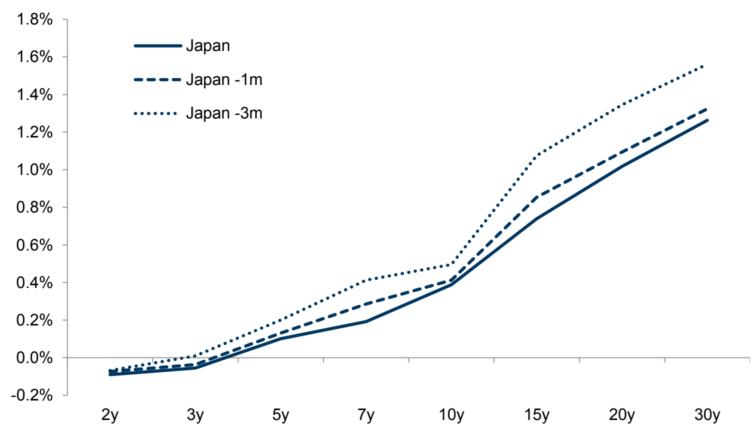
Source: Datastream, Goldman Sachs Global Investment Research

Exhibit 80: German yield curve dynamics
Current relative to 1 month and 3 months ago



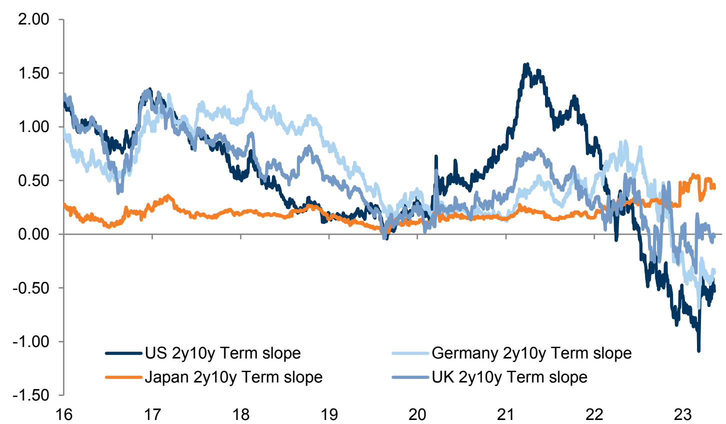
Source: Datastream, Goldman Sachs Global Investment Research

Exhibit 81: Japan yield curve dynamics
Current relative to 1 month and 3 months ago



Source: Datastream, Goldman Sachs Global Investment Research

Exhibit 82: Yield curve term slope across regions

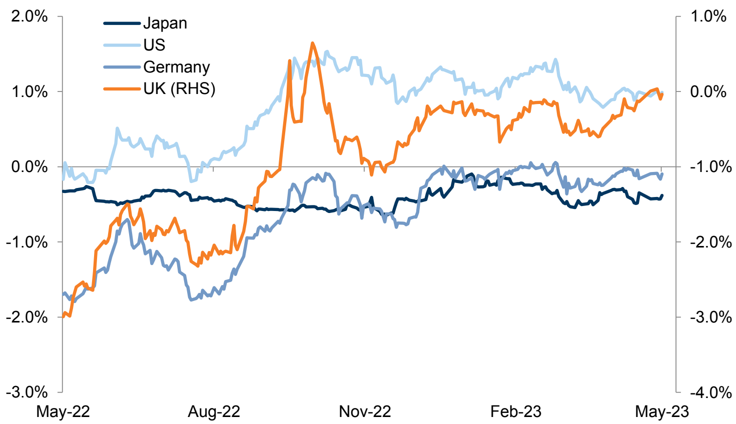


Source: Datastream, Goldman Sachs Global Investment Research

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

Exhibit 83: 10y real yields across regions

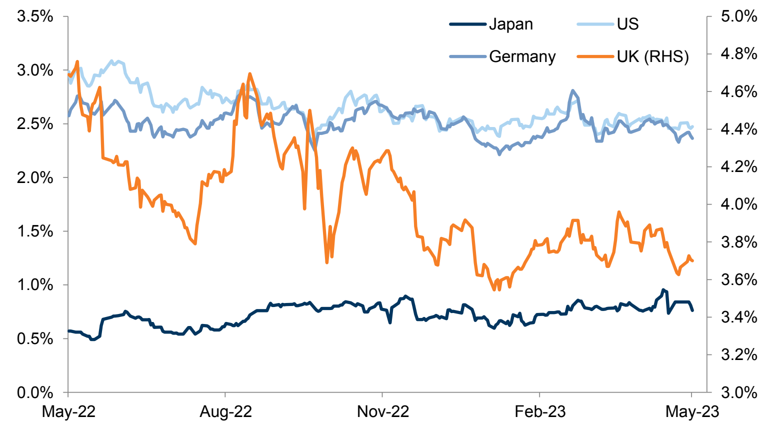
Nominal bond yield minus CPI inflation swap (RPI for the UK)



Source: Goldman Sachs, Goldman Sachs Global Investment Research

Exhibit 84: 10y inflation swaps across regions

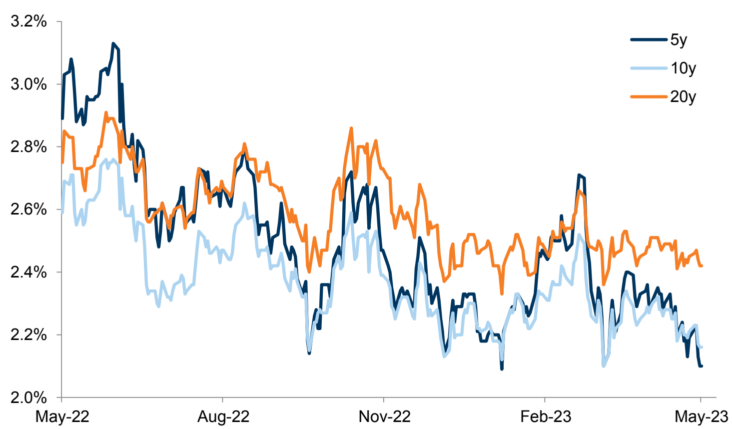
CPI inflation swap (RPI for the UK)



Source: Goldman Sachs, Goldman Sachs Global Investment Research

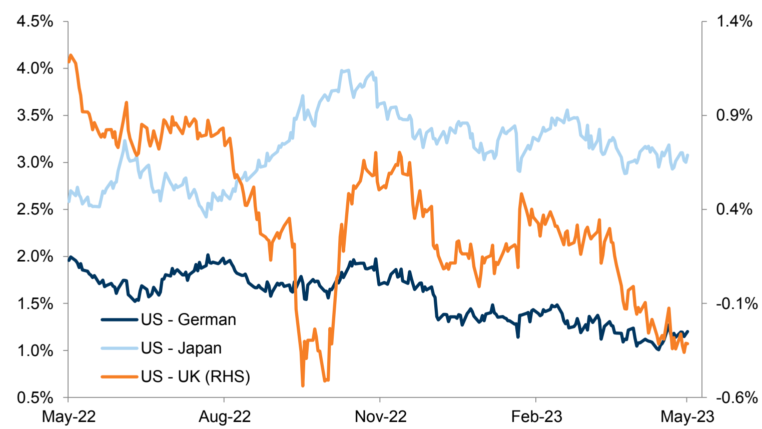
Exhibit 85: US breakeven inflation

Nominal yield minus TIPS yield



Source: Datastream, Goldman Sachs Global Investment Research

Exhibit 86: 10y nominal bond yield differentials



Source: Datastream, Goldman Sachs Global Investment Research

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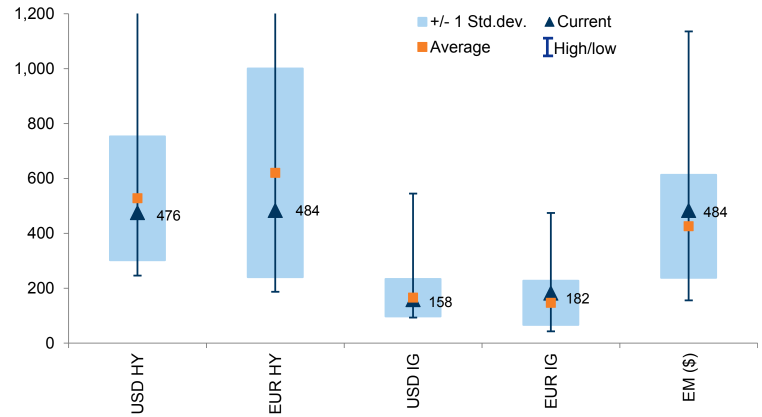
Credit: Spreads - history and forecasts

Exhibit 87: Credit spread forecasts
Bloomberg Barclays US IG/HY, iBoxx EUR IG, BAML EUR HY

Index	Updated as of May 10, 2023			
	Current	2023Q2	2023Q3	2023Q4
USD spreads				
USD IG	146	117	115	115
USD Fin	172	125	122	122
USD Non-Fin	132	112	110	110
USD HY	471	400	390	390
EUR spreads				
EUR IG	183	150	145	145
EUR Fin	236	175	165	165
EUR Non-Fin	151	130	127	127
EUR HY	487	415	405	405

Source: Bloomberg-Barclays, ICE-BAML, iBoxx, Goldman Sachs Global Investment Research

Exhibit 88: 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)

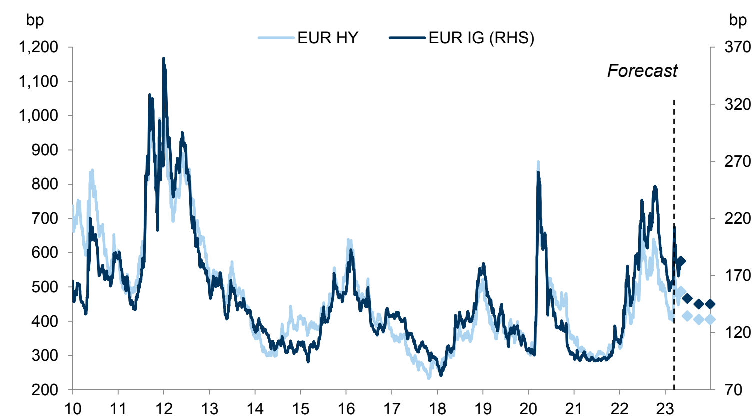


Source: Haver Analytics, iBoxx, Goldman Sachs Global Investment Research

Exhibit 89: Our USD spread forecast for IG vs. HY

Source: Bloomberg-Barclays, Goldman Sachs Global Investment Research

Exhibit 90: Our EUR spread forecast for IG vs. HY



Source: ICE-BAML, iBoxx, Goldman Sachs Global Investment Research

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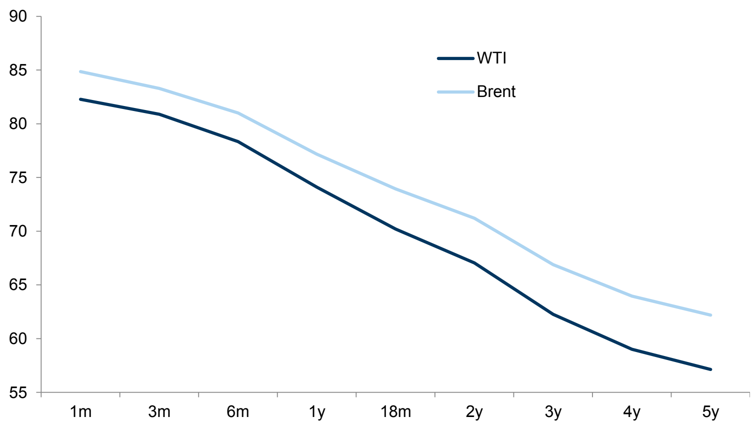
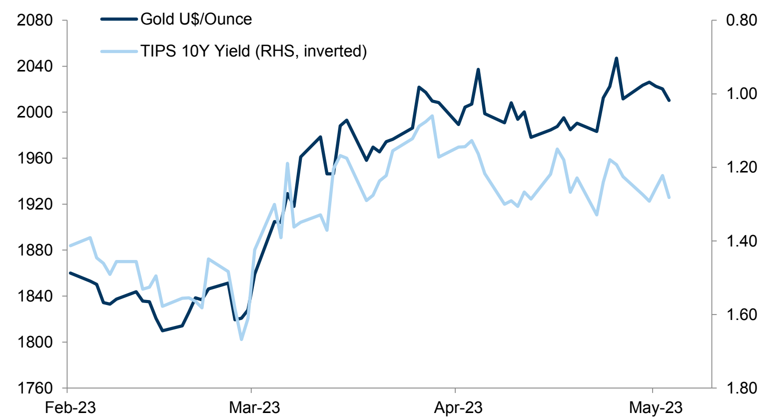
Commodities: Curve shapes and roll yields

Exhibit 91: WTI and Brent oil forward curves



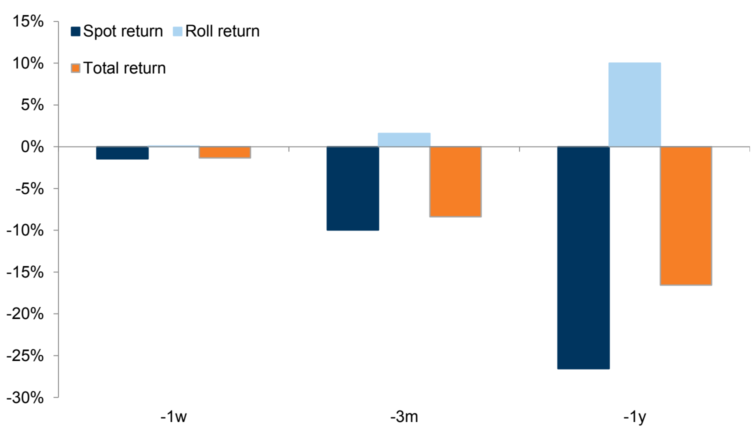
Source: Goldman Sachs, Goldman Sachs Global Investment Research

Exhibit 92: Gold price and US real yields
US 10-year TIPs yield, Gold U$/ounce



Source: Datastream, Goldman Sachs Global Investment Research

Exhibit 93: 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 94: 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**	**-1.3**	**-9.0**	**-18.4**
Energy	57.9	-0.9	-12.6	-23.8
Industrial Metals	11.2	-4.4	-7.6	-13.0
Precious Metals	4.7	-0.8	0.0	11.6
Agriculture	19.1	-2.3	-4.2	-18.3
Livestock	7.0	1.6	-0.5	6.1

Source: Goldman Sachs, Goldman Sachs Global Investment Research

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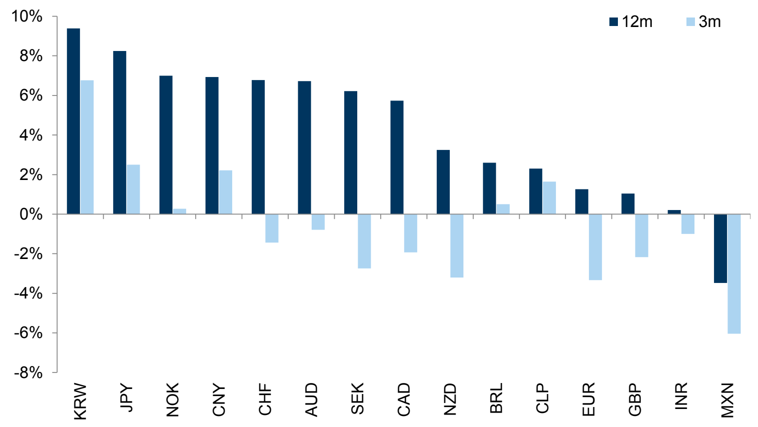
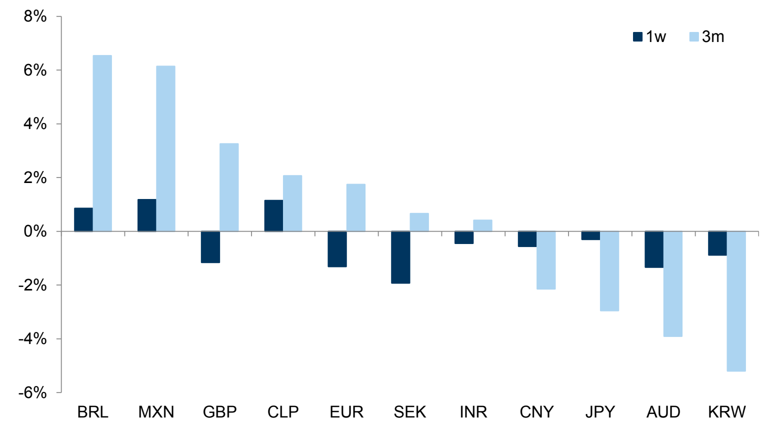
FX: Forecasts and forwards, recent performance and positioning

Exhibit 95: Our 3- and 12-month forecasts for dollar crosses



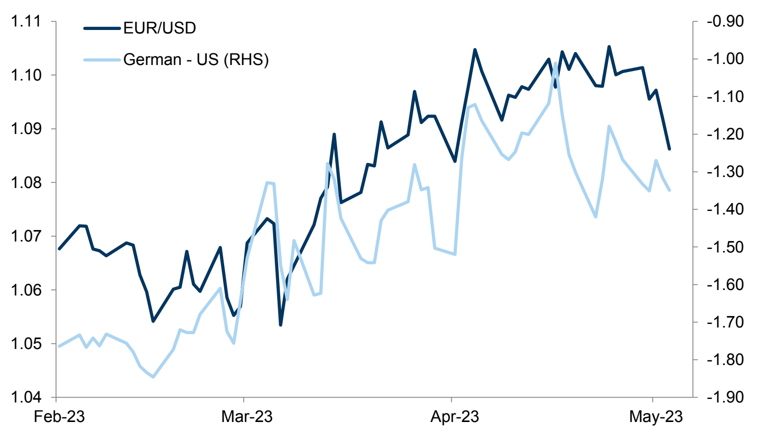
Source: Datastream, Goldman Sachs Global Investment Research

Exhibit 96: Recent performance of dollar crosses
Percentage change over past 1 week, 3 months



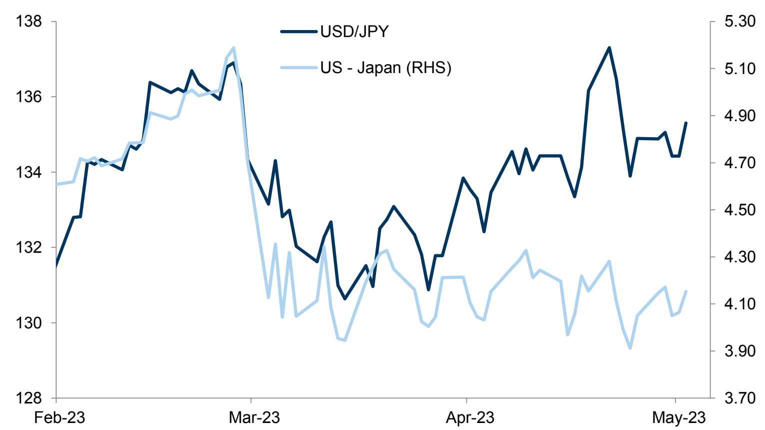
Source: Datastream, Goldman Sachs Global Investment Research

Exhibit 97: EUR/USD against German - US 2y interest rate differentials past 3m



Source: Datastream, Goldman Sachs Global Investment Research

Exhibit 98: USD/JPY against US - Japan 2y interest rate differentials past 3m



Source: Datastream, Goldman Sachs Global Investment Research

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Reg AC

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