US Equity Views

Higher rates, lower valuation: Reducing S&P 500 year-end 2022 target to 3600 and exploring scenarios for 2023

David J. Kostin
+1(212)902-6781 | david.kostin@gs.com
Goldman Sachs & Co. LLC

Ben Snider
+1(212)357-1744 | ben.snider@gs.com
Goldman Sachs & Co. LLC

Ryan Hammond
+1(212)902-5625 |
ryan.hammond@gs.com
Goldman Sachs & Co. LLC

Cormac Conners
+1(212)357-6308 |
cormac.x.conners@gs.com
Goldman Sachs & Co. LLC

Lily Calcagnini
+1(212)357-5913 | lily.calcagnini@gs.com
Goldman Sachs & Co. LLC

Jenny Ma
+1(212)357-5775 | jenny.ma@gs.com
Goldman Sachs & Co. LLC

Daniel Chavez
+1(212)357-7657 |
daniel.chavez@gs.com
Goldman Sachs & Co. LLC

The expected path of interest rates is now higher than we previously assumed, which tilts the distribution of equity market outcomes below our prior forecast. The S&P 500 index actually reached our previous year-end target of 4300 in mid-August, but the rate complex has subsequently shifted dramatically. The higher interest rate scenario that we now incorporate into our valuation model supports a P/E of 15x (vs. prior forecast of 18x) and implies a year-end (3-month) S&P 500 target of 3600 (-5%) and 6-month and 12-month forecasts of 3600 (-5%) and 4000 (+6%).

Equity valuations have closely tracked real interest rates until recently. Real yields have soared from 0.4% to 1.3% during the past month and could reach 1.5% by year-end. For context, real yields were *negative* 1% at the start of the year when the S&P 500 index hit an all-time high of 4800 and traded at a P/E of 21x. The tightest yield gap between equities and rates since the pandemic further tilts the balance of risks to the downside.

The outlook is unusually murky. The forward paths of inflation, economic growth, interest rates, earnings, and valuations are all in flux more than usual with a wider distribution of potential outcomes. Based on our client discussions, a majority of equity investors have adopted the view that a hard landing scenario is inevitable and their focus is on the timing, magnitude, and duration of a potential recession and investment strategies for that outlook.

We previously published that in a recession falling S&P 500 EPS could cause the index to decline to 3150 (-17%). A 11% drop in EPS would be consistent with modestly negative real GDP growth and the 13% median EPS drop during prior recessions. Under a "hard landing" scenario, the yield gap would rise and the 3-, 6-, and 12-month S&P 500 targets would be 3400 (-10%) / 3150 (-17%) / 3750 (-1%).

In the near term, investor focus will soon turn from valuation to earnings. The surprisingly high August inflation reading was a pivotal event for macro investors regarding the path of Fed hikes. The analogue for stock investors is 3Q earnings season where record high profit margins will be under scrutiny.

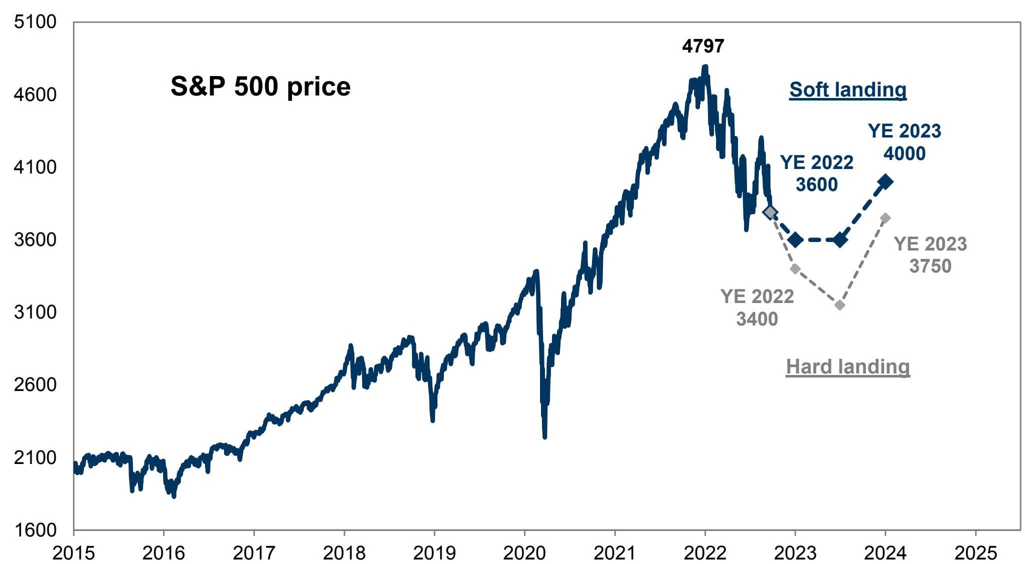
Recommended investment strategies. Elevated uncertainty argues for defensive positioning. Surging rates means short duration (GSTHSDUR) will outperform long duration (GSTHLDUR). Own stocks with "Quality" attributes such as strong balance sheets, high returns on capital, and stable sales growth (GSTHQUAL).

S&P 500 index: The path ahead in 2022 and 2023

The range of potential paths of the equity market is much wider than usual because the various forecast drivers are themselves unusually unstable. The recursive process between growth, inflation, Fed tightening, and asset prices should continue. The unemployment rate is low by historical standards and consumer incomes and spending are likely to increase in 2023. But strong growth means inflation could prove more persistent and require even more Fed tightening than is currently priced, ultimately pushing asset prices lower.

Most portfolio managers believe that in order to corral inflation the Fed will have to hike rates sufficiently high that it will result in a US recession at some point during 2023. Given the crosswinds and multiple alternative outcomes, we summarize the key assumptions underpinning our baseline "soft landing" and alternative "hard landing" scenarios.

Exhibit 1: Path of the S&P 500



Source: Goldman Sachs Global Investment Research

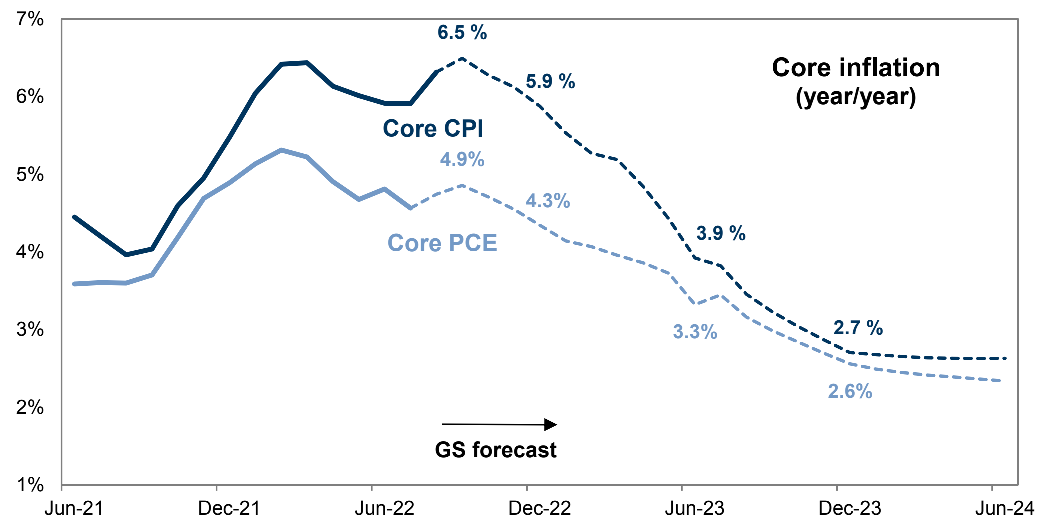
Exhibit 2: Goldman Sachs US Portfolio Strategy S&P 500 forecasts

	Soft landing			Hard landing		
	YE 2022	Mid-2023	YE 2023	YE 2022	Mid-2023	YE 2023
GS EPS						
2023	$234	$234	$234	$200	$200	$200
Growth vs. 2022	*3 %*	*3 %*	*3 %*	*(11)%*	*(11)%*	*(11)%*
2024	243	243	243	230	230	230
Growth vs. 2023	*4 %*	*4 %*	*4 %*	*15 %*	*15 %*	*15 %*
Market pricing of NTM EPS	$234	$238	$243	$230	$220	$225
Growth rate	*3 %*	*4 %*	*4 %*	*2 %*	*3 %*	*12 %*
Real 10-yr UST yield	1.5%	1.7%	1.3%	0.5%	0.0%	0.3%
Real yield gap	499 bp	499 bp	484 bp	631 bp	701 bp	575 bp
%ile rank since 1990	*61 %*	*61 %*	*63 %*	*25 %*	*10 %*	*41 %*
Implied NTM P/E	15.4 x	15.1 x	16.4 x	14.7 x	14.3 x	16.7 x
%ile rank since 1990	*52 %*	*46 %*	*67 %*	*41 %*	*35 %*	*70 %*
S&P 500 level	**3600**	**3600**	**4000**	**3400**	**3150**	**3750**
Change from current	*(5)%*	*(5)%*	*6 %*	*(10)%*	*(17)%*	*(1)%*

Source: Goldman Sachs Global Investment Research

Inflation has proved more persistent than expected and is unlikely to show clear signs of easing in the near term. Inflation reaccelerated in August, piercing equity investor hopes of peak inflation and peak Fed hawkishness. On a year/year basis, core CPI inflation rose to 6.3% in August and our economists expect core PCE inflation to similarly rise to 4.7%. While goods inflation has showed signs of easing, the broad-based strength in wage-sensitive services categories, such as shelter and food away from home, has added to the Fed's challenge.

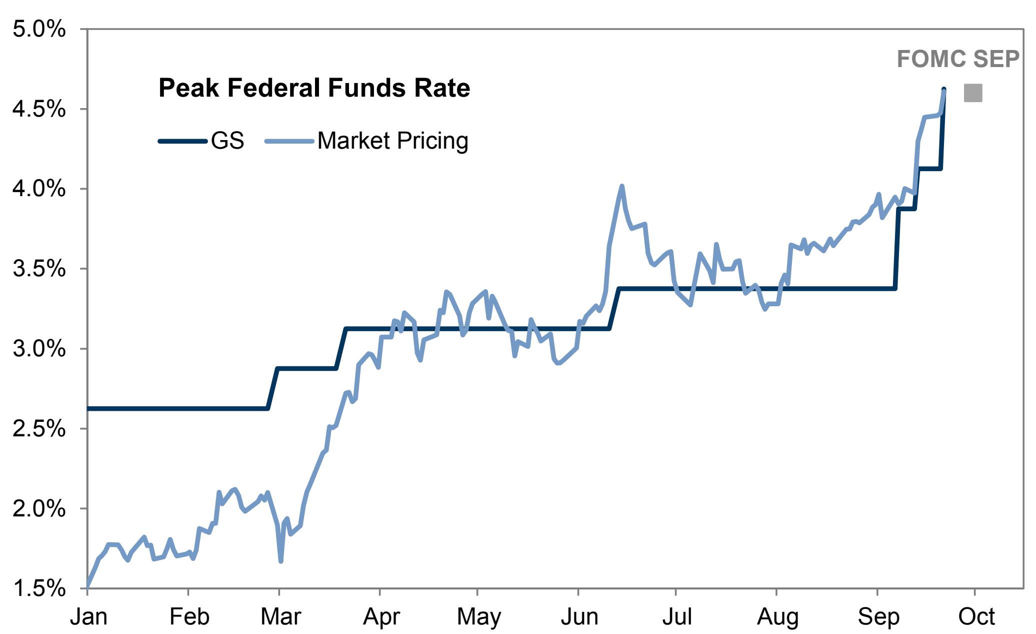
Exhibit 3: Inflation is likely to stay elevated into year-end



Source: Goldman Sachs Global Investment Research

Persistent inflation has led to even higher expectations for Fed tightening. In May, when we lowered our year-end price target from 4700 to 4300, the futures market was pricing a peak fed funds rate of 3.25%. Today, the market is pricing a peak fed funds rate of 4.6%. Following the Fed's 75 bp hike at its September meeting, our economists now forecast the FOMC will raise the policy rate by 75 bp in November, 50 bp in December, and 25 bp in February for a peak funds rate of 4.5%-4.75%.

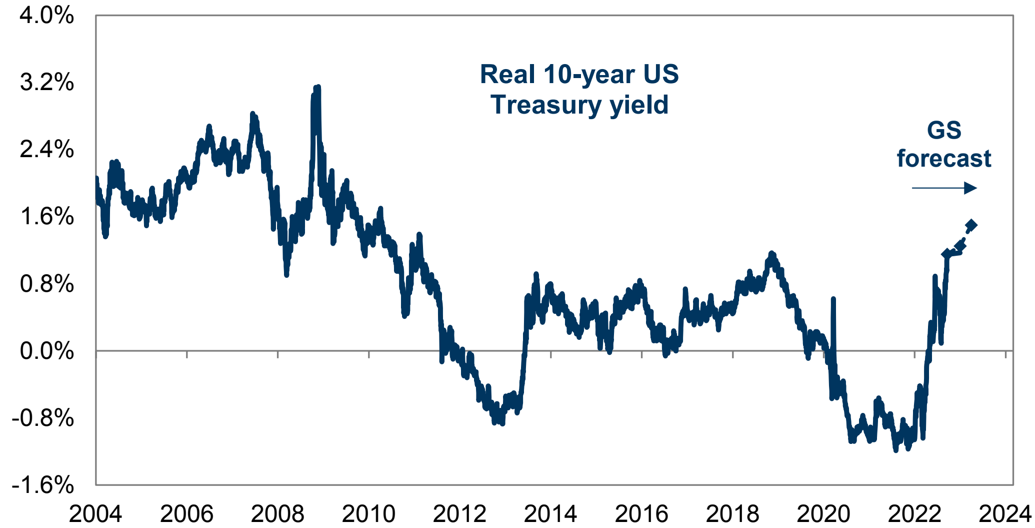
Exhibit 4: Sharp repricing in the peak federal funds rate



Source: FRB, Goldman Sachs Global Investment Research

The hawkish Fed pivot has pushed real 10-year US Treasury yields up by 240 bp YTD and risks are tilted towards higher rates. The real 10-year US Treasury yield has surged from -1.1% at the start of the year to +1.3%, the highest level since 2011. Our rates strategists recently revised their forecasts higher and expect the real 10-year US Treasury yield to end 2022 at 1.25% before reaching a peak of 1.5%.

Exhibit 5: Risks to real interest rates are tilted to higher for longer

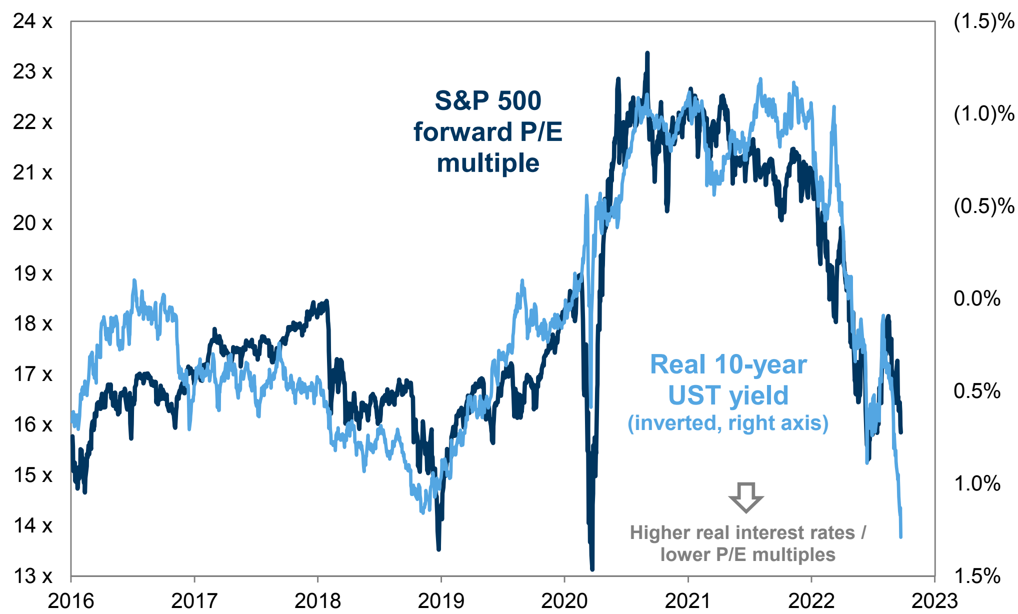


Source: Goldman Sachs Global Investment Research

Equity valuations have declined alongside higher real rates, but by less than the recent relationship would have implied, all else equal. The relationship between equities and rates is dynamic. The drivers of changes in real yields determine the impact on equity valuations. The increasing weight of high-growth technology companies in the index has also increased its duration and rate sensitivity.

Equity valuations and real yields have moved in lockstep for the past few years. Changes in real yields have largely reflected the shift in Fed policy rather than growth expectations recently. The S&P 500 forward P/E multiple has collapsed from 21x at the start of the year when real rates were negative to 16x today when real rates are positive. However, in the past few weeks, the relationship has dislocated; equity valuations have declined from their recent peak but still trade above the level implied by the recent relationship with real rates. Based solely on the recent relationship with real yields, the S&P 500 index should trade at a multiple of 14x rather than the current multiple of 16x.

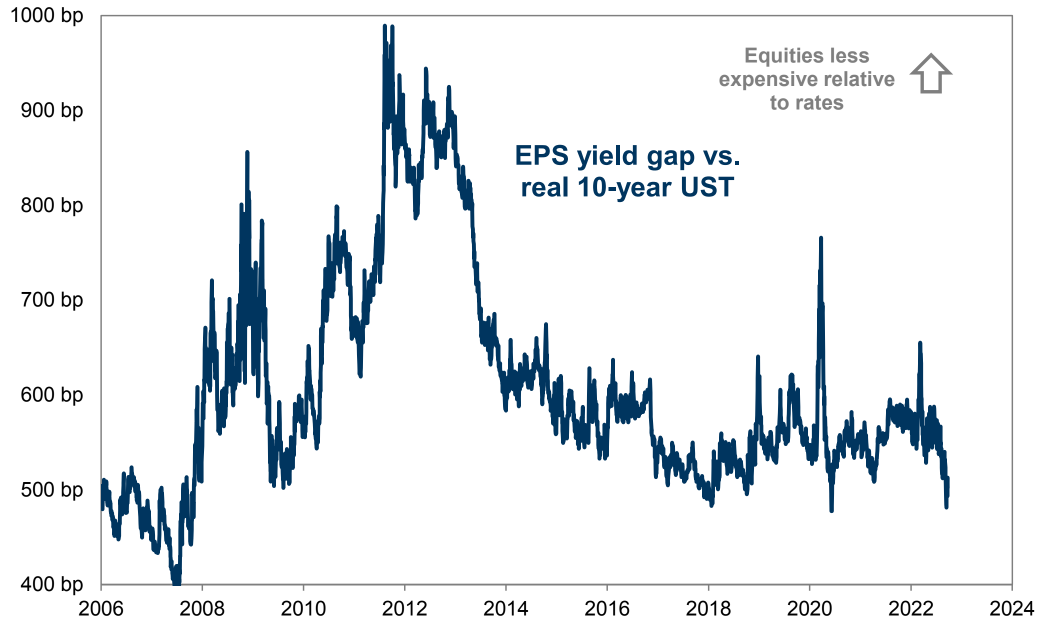
Exhibit 6: Valuation and real rates have recently dislocated, posing a risk to equities



Source: Goldman Sachs Global Investment Research

The yield gap ("ERP") has already compressed to the lows from the last cycle despite concerns about Fed tightening leading to a recession, creating a vulnerable backdrop for equities. We model the real yield gap, defined as the difference between the earnings yield and the real 10-year US Treasury yield, as a function of four variables: Growth expectations, consumer confidence, policy uncertainty, and the size of the Fed balance sheet. Resilient investor growth expectations as well as improving long-term inflation expectations and confidence help explain some narrowing of the yield gap. However, the yield gap compression has far surpassed the level implied by our macro model. Equities appear priced for an optimistic outcome given the likely path of data in the near term. The yield gap currently equals roughly 500 bp, compared with nearly 600 bp in June, and is close to the levels from 2020 (emerging from the pandemic) and 2017 (tax cuts).

Exhibit 7: The yield gap has compressed to cycle lows despite a challenging macro backdrop



Source: Goldman Sachs Global Investment Research

Given this balance of risks, we lower our year-end 2022 S&P 500 price target to 3600. We maintain our 2023 S&P 500 EPS estimate of $234, representing modest growth of 3% vs. 2022. Our earnings estimates are 3% below bottom-up consensus ($241) and in coming months we expect negative revisions to consensus estimates. Our reduced price target is entirely driven by higher interest rates and therefore lower valuation. We previously assumed real rates would end 2022 at roughly 0.5%, compared with our revised assumption of 1.5%. We assume a similar yield gap of 499 bp (vs. 495 bp previously). The higher interest rate environment means that our implied year-end P/E multiple is cut from 18x to 15x. By year-end 2023, as inflation data are more clearly improving in a soft landing scenario, we expect the yield gap can narrow modestly and the multiple will expand to 16x.

Exhibit 8: Scenario analysis of 2022 S&P 500 price and valuation

Year-end 2022 — NTM P/E and index level

NTM yield gap	Assumes expected 2023 EPS of $234	10-year real UST yield: 0.50%	1.00%	1.50%	2.00%	2.50%
	450 bp	20x *4700*	18x *4250*	17x *3900*	15x *3600*	14x *3350*
Current	500 bp	18 *4250*	17 *3900*	15 *3600*	14 *3350*	13 *3100*
	550 bp	17 *3900*	15 *3600*	14 *3350*	13 *3100*	13 *2950*
	600 bp	15 *3600*	14 *3350*	13 *3100*	13 *2950*	12 *2750*

Source: Goldman Sachs Global Investment Research

Exhibit 9: Scenario analysis of 2023 S&P 500 price and valuation

Year-end 2023 — NTM P/E and index level

NTM yield gap	Assumes expected 2024 EPS of $243	10-year real UST yield: 0.50%	1.00%	1.25%	1.50%	2.00%
	450 bp	20x *4850*	18x *4400*	17x *4250*	17x *4050*	15x *3750*
	485 bp	19 *4550*	17 *4150*	16 *4000*	16 *3850*	15 *3550*
	550 bp	17 *4050*	15 *3750*	15 *3600*	14 *3450*	13 *3250*
	600 bp	15 *3750*	14 *3450*	14 *3350*	13 *3250*	13 *3050*

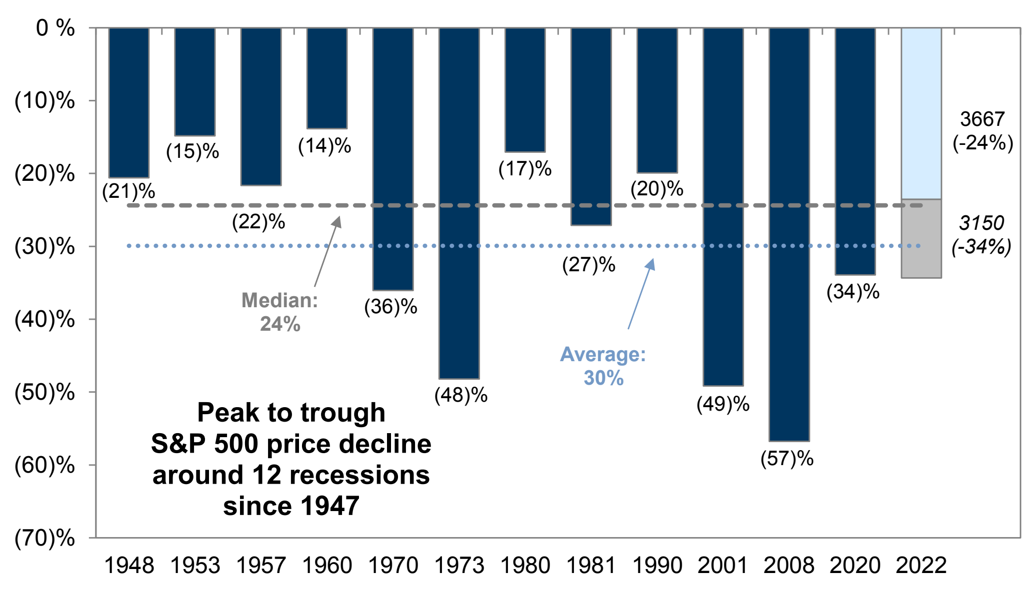
Source: Goldman Sachs Global Investment Research

Risks to the outlook are skewed to the downside even after our forecast revision. What is good news for economic growth is not necessarily good news for the Fed's inflation mandate and the equity market. If the expected rebound in real income and spending growth drives a rebound in economic growth, it could require more Fed tightening to keep economic growth below trend. The prospect of additional Fed hikes poses upside risks to real yields and downside risk to equity valuations and the tightening could tip the economy into recession.

In a recession, we forecast earnings will fall and the yield gap will widen, pushing the index to a trough of 3150. Our economists assign a 35% probability of recession in the next 12 months and note that any recession would likely be mild given the lack of major financial imbalances in the economy. As we previously outlined, in the event of a moderate recession, our top-down model indicates EPS would fall by 11% to $200. However, prices move faster than analyst estimates, so we assume the market prices earnings of $220, halfway between consensus today and our recession earnings. Our 2024 EPS estimate assumes a 15% recovery in EPS to $230 which is similar to prior post-recession profit rebounds. From a valuation perspective, we assume real rates would fall to 0% as the Fed moves to cut rates and our yield gap model suggests a widening to 700 bp. The implied forward P/E multiple of the index would equal 14x.

For context, a 34% peak-to-trough decline in the S&P 500 index during a recession would only be slightly worse than the historical average of 30%. We see two risks that would create a more dramatic sell-off in equities during a recession. First, if inflation concerns were to limit the degree of monetary or fiscal policy support and interest rates did not fall, it could lead to even lower valuations or even larger economic and earnings growth declines than we model. Second, concentrated sector weakness, such as Information Technology in 2001 and Financials in 2008, could lead to an even sharper earnings and price decline.

Exhibit 10: S&P 500 typically falls by 30% from peak to trough in recessions

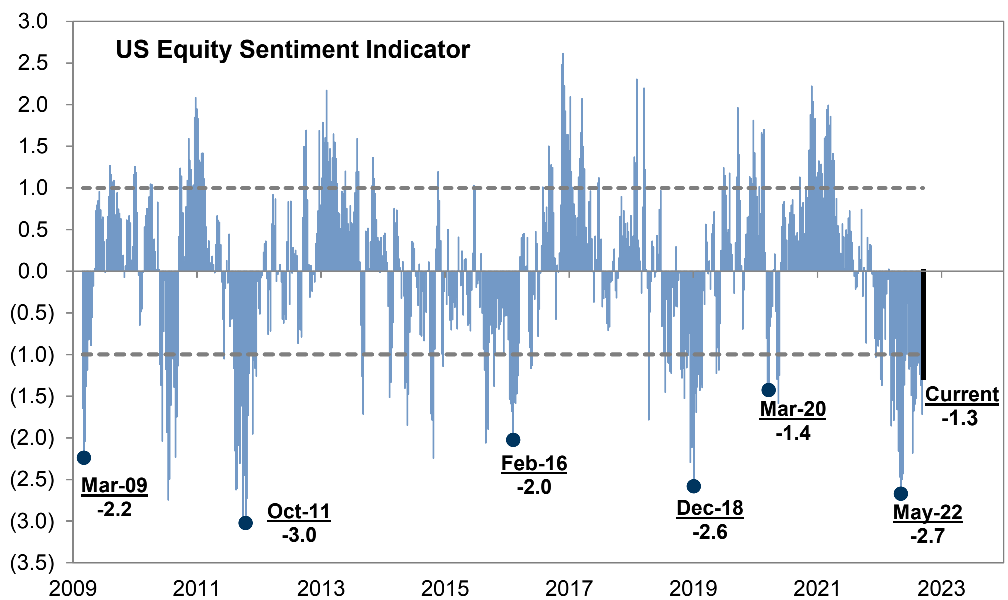


Source: Goldman Sachs Global Investment Research

A year-end rally to 4300 is possible if inflation shows clear signs of easing. Longer term inflation expectations have declined in recent months alongside falling gas prices, easing investor concern about de-anchoring. If realized inflation is surprisingly soft in upcoming meetings, it could catalyze modestly lower real rates and higher equity valuations. This dynamic occurred in August, as hope for a Fed pivot took hold and the S&P 500 reached 4305.

A near-term rally alongside encouraging inflation data would be exacerbated by light equity investor positioning and attractive seasonality. Equity investor positioning remains bearish. Our Sentiment Indicator currently stands at 1.3 standard deviations light. In particular, non-dealer futures positions are net short. In addition, S&P 500 returns are typically strongest during the fourth quarter, as investors seek to maximize returns heading into year-end. This seasonality may be especially important in 2022 as the uncertainty from US midterm elections fades. Furthermore, the recently passed tax law includes a 1% excise tax on corporate cash used to repurchase shares starting in January. On the margin, companies have an incentive to accelerate planned repurchases into 4Q to avoid this incremental cost. Taken together, light positioning and attractive seasonality create the risk of sharp, outsized rallies on the back of incrementally positive inflation news.

Exhibit 11: Equity investor positioning remains in light territory



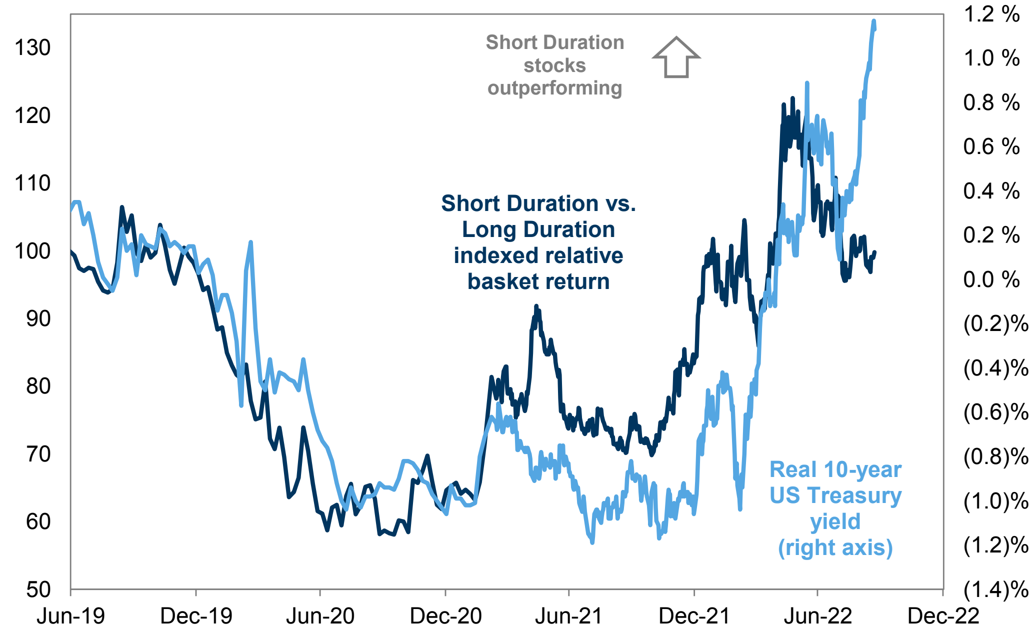
Source: Goldman Sachs Global Investment Research

However, upside is ultimately capped around 4300 because any sustained rally would ease financial conditions and require additional Fed tightening to tame inflation. Our economists' framework for Fed policy centers on financial conditions. Equity valuations are a key component of their Financial Conditions Index. Rising equity valuations would ease financial conditions and be stimulative to economic growth, thereby working against the Fed's stated goal of keeping economic growth below potential to tame inflation.

Investment strategies

1. Higher real rates. Equity investors should own Short Duration equities (GSTHSDUR) relative to Long Duration equities (GSTHLDUR). Stocks with cash flows weighted heavily towards the distant future are more sensitive to changes in the discount rate via higher interest rates. Historically, short duration equities outperform long duration peers as real rates rise. However, in recent weeks, long duration stocks have been surprisingly resilient in the face of higher real rates (Exhibit 12). Given the balance of risk is skewed towards higher rates for longer, we recommend investors own Short Duration (GSTHSDUR) vs. Long Duration (GSTHLDUR). We rebalance both baskets in this report.

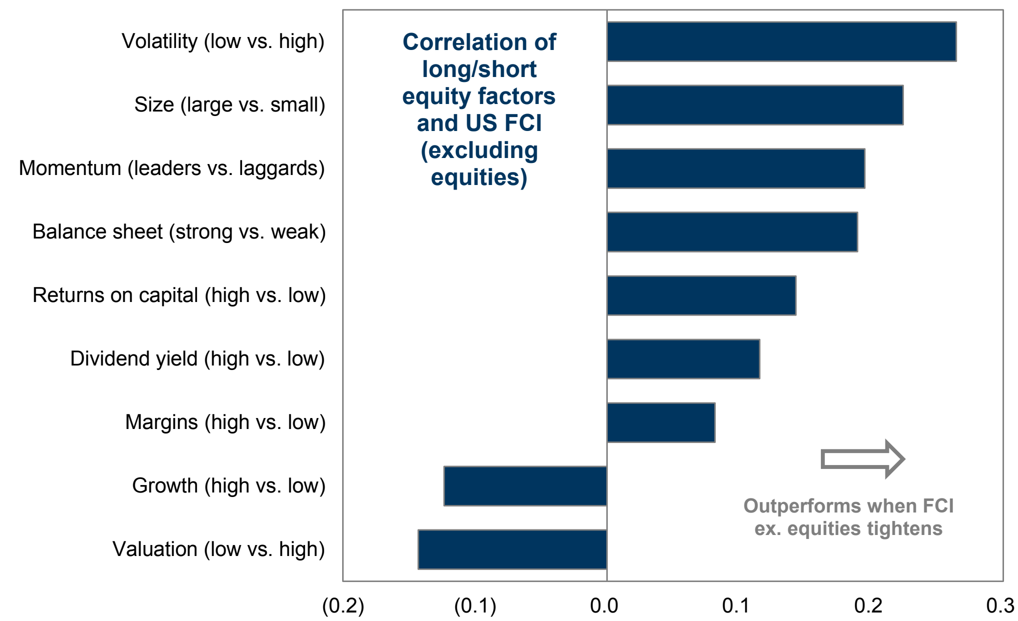
Exhibit 12: Short duration equities typically outperform as real rates rise



Source: Goldman Sachs Global Investment Research

2. Tightening financial conditions. Equity investors should own Quality stocks (GSTHQUAL). Lower equity prices and higher interest rates will continue to tighten financial conditions. Historically, when financial conditions tighten, equity investors reward companies with "quality" attributes that are able to withstand the challenging macro environment (Exhibit 13). We recommend investors own our Quality basket (GSTHQUAL). The basket contains stocks with the highest "quality" scores in each sector. Stocks with high quality scores have a combination of strong balance sheets, histories of stable sales and earnings growth, above-average ROE, and low historical drawdown risk.

Exhibit 13: Quality factors typically outperform as FCI tightens



Source: Goldman Sachs Global Investment Research

Basket Constituents

Exhibit 14: Constituents of our Short Duration basket (GSTHSDUR)

bold indicates new constituents

Ticker	Company	Market Cap (bn)	YTD Return	Sales Growth 2022	Sales Growth 2023	EPS 2022	NTM EV/ Sales	Equity duration (years)
Consumer Discretionary								
M	**Macy's Inc**	**$ 4**	**(36)%**	**33 %**	**3 %**	**$ 4.2**	**0 x**	**13.5**
GM	General Motors Company	55	(36)	4	20	6.8	1	**14.8**
KSS	**Kohl's Corp.**	**3**	**(41)**	**18**	**(4)**	**3.4**	**1**	**15.3**
MAT	Mattel, Inc.	7	(3)	19	8	1.5	2	**15.4**
PVH	**PVH Corp.**	**3**	**(51)**	**22**	**(1)**	**8.1**	**1**	**15.8**
TOL	**Toll Brothers, Inc.**	**5**	**(40)**	**22**	**8**	**9.4**	**1**	**17.2**
Consumer Staples								
ACI	**Albertsons Companies, Inc.**	**14**	**(12)**	**4**	**5**	**2.9**	**0**	**17.4**
WBA	Walgreens Boots Alliance, Inc.	29	(34)	(4)	0	4.9	1	**17.8**
KHC	Kraft Heinz Company	42	(1)	(1)	(0)	2.7	2	**18.2**
BG	Bunge Limited	14	(3)	43	15	12.8	0	**18.4**
Energy								
OVV	**Ovintiv Inc**	**12**	**44**	**42**	**35**	**10.0**	**1**	**20.0**
DTM	**DT Midstream, Inc.**	**5**	**20**	**NM**	**7**	**3.6**	**9**	**20.2**
OXY	**Occidental Petroleum Corp.**	**58**	**118**	**46**	**44**	**10.7**	**3**	**20.5**
Health Care								
QDEL	QuidelOrtho Corp.	5	(44)	2	126	12.3	1	**6.3**
VTRS	**Viatris, Inc.**	**11**	**(31)**	**49**	**(8)**	**3.4**	**2**	**11.5**
MRNA	Moderna, Inc.	49	(50)	2199	19	26.5	3	**12.1**
THC	**Tenet Healthcare Corp.**	**6**	**(32)**	**10**	**(1)**	**6.5**	**1**	**13.7**
ABC	**AmerisourceBergen Corp.**	**29**	**6**	**12**	**9**	**11.1**	**0**	**16.0**
ENOV	**Enovis Corp.**	**3**	**(36)**	**26**	**(59)**	**2.3**	**2**	**19.3**
REGN	**Regeneron Pharmaceuticals, Inc.**	**73**	**8**	**89**	**(25)**	**41.9**	**6**	**19.4**
UHS	Universal Health Services, Inc.	6	(27)	9	5	10.0	1	**19.5**
Industrials								
R	**Ryder System, Inc.**	**4**	**(11)**	**15**	**24**	**14.9**	**1**	**18.3**
GTES	**Gates Industrial Corp. plc**	**3**	**(33)**	**24**	**4**	**1.2**	**2**	**19.4**
UNVR	**Univar Solutions Inc.**	**4**	**(17)**	**15**	**20**	**3.4**	**1**	**19.4**
BLDR	Builders FirstSource, Inc.	9	(34)	131	11	15.4	1	**19.6**
UHAL	**AMERCO**	**10**	**(28)**	**23**	**7**	**58.0**	**2**	**19.7**
Information Technology								
HPE	Hewlett Packard Enterprise Co.	$ 16	(18)%	3 %	1 %	$ 2.0	1 x	**16.5**
WDC	Western Digital Corp.	11	(47)	6	(5)	5.5	1	**17.5**
INTC	Intel Corp.	117	(43)	(4)	(12)	2.2	2	**18.2**
ARW	Arrow Electronics, Inc.	6	(29)	20	8	22.1	0	**18.7**
AVT	Avnet, Inc.	4	(7)	18	11	6.9	0	**18.8**
DXC	DXC Technology Co.	6	(14)	(9)	(10)	3.5	1	**19.0**
MU	**Micron Technology, Inc.**	**55**	**(46)**	**22**	**1**	**7.0**	**2**	**19.1**
AMD	**Advanced Micro Devices, Inc.**	**120**	**(48)**	**68**	**60**	**4.3**	**3**	**19.2**
WU	Western Union Company	5	(17)	5	(12)	1.8	2	**19.6**
SNX	TD SYNNEX Corp.	9	(21)	35	82	11.6	0	**19.8**
FIS	Fidelity National Information Services, Inc.	49	(25)	11	6	7.1	4	**20.1**
COHR	**Coherent Corp.**	**5**	**(40)**	**17**	**37**	**3.7**	**1**	**20.1**
QRVO	**Qorvo, Inc.**	**9**	**(46)**	**17**	**(5)**	**9.2**	**2**	**20.3**
GPN	**Global Payments Inc.**	**33**	**(10)**	**15**	**5**	**9.5**	**5**	**20.3**
MKSI	**MKS Instruments, Inc.**	**6**	**(50)**	**27**	**9**	**10.5**	**1**	**20.4**
Materials								
CLF	Cleveland-Cliffs Inc	7	(34)	284	15	4.2	1	**6.8**
VVV	**Valvoline, Inc.**	**5**	**(25)**	**26**	**9**	**2.0**	**2**	**9.8**
Communication Services								
FYBR	**Frontier Communications Parent, Inc.**	**6**	**(21)**	**(8)**	**(10)**	**1.1**	**2**	**4.6**
DISH	DISH Network Corp.	5	(51)	15	(6)	2.6	2	**11.6**
LUMN	Lumen Technologies, Inc.	9	(28)	(5)	(10)	1.6	2	**15.7**
PARA	Paramount Global	14	(27)	13	7	2.3	1	**16.6**
T	AT&T Inc.	116	(8)	(2)	(24)	2.5	2	**18.3**
Utilities								
NRG	NRG Energy, Inc.	10	1	197	7	7.8	1	**9.3**
PCG	**PG&E Corp.**	**26**	**7**	**12**	**8**	**1.1**	**3**	**18.5**
GSTHSDUR median		**$ 9**	**(28)%**	**17 %**	**6 %**	**$ 5.2**	**1 x**	**18.3**
Russell 1000 median		**14**	**(19)**	**10**	**5**	**4.8**	**3**	**22.1**

Source: FactSet, Goldman Sachs Global Investment Research

Exhibit 15: Constituents of our Long Duration basket (GSTHLDUR)

bold indicates new constituents

Ticker	Company	Market Cap (bn)	YTD Return	Sales Growth 2022	Sales Growth 2023	EPS 2022	NTM EV/ Sales	Equity duration (years)
Consumer Discretionary								
CVNA	Carvana Co.	$ 3	(87)%	129 %	20 %	$(8.7)	1 x	29.7
PTON	**Peloton Interactive, Inc.**	3	(75)	29	(12)	(5.4)	1	26.7
H	**Hyatt Hotels Corp.**	4	(11)	46	87	0.6	2	25.0
GME	GameStop Corp.	8	(28)	14	5	(1.4)	1	24.5
BKNG	Booking Holdings Inc.	72	(25)	61	54	97.2	4	23.8
HD	**Home Depot, Inc.**	278	(33)	15	4	16.5	2	23.8
Consumer Staples								
CL	**Colgate-Palmolive Company**	63	(11)	6	3	3.0	4	23.6
LW	**Lamb Weston Holdings, Inc.**	11	24	5	14	2.5	3	23.5
FRPT	Freshpet Inc	2	(59)	33	36	(1.0)	2	23.4
OLPX	**Olaplex Holdings, Inc.**	8	(59)	NM	37	0.5	9	23.3
Energy								
NFE	New Fortress Energy Inc.	10	104	316	68	2.0	5	24.2
PDCE	**PDC Energy, Inc.**	6	27	39	107	16.5	2	23.8
EQT	**EQT Corp.**	17	111	31	27	4.9	2	23.7
Health Care								
MRTX	Mirati Therapeutics Inc.	4	(51)	438	(86)	(13.7)	25	35.8
TDOC	Teladoc Health, Inc.	5	(69)	86	18	(61.2)	2	30.0
NTRA	Natera, Inc.	5	(48)	60	31	(5.8)	4	27.1
SRPT	Sarepta Therapeutics, Inc.	10	22	30	31	(6.8)	8	25.0
RARE	Ultragenyx Pharmaceutical, Inc.	3	(48)	30	15	(8.3)	7	24.7
GH	**Guardant Health, Inc.**	5	(46)	30	24	(6.3)	10	24.3
EXAS	Exact Sciences Corp.	6	(53)	18	14	(4.3)	3	24.1
ALNY	**Alnylam Pharmaceuticals, Inc**	25	22	71	27	(7.4)	17	24.1
Industrials								
CPA	**Copa Holdings, S.A.**	2	(12)	89	91	6.3	NM	26.1
LYFT	Lyft, Inc.	5	(63)	36	27	0.4	1	25.8
UBER	Uber Technologies, Inc.	60	(27)	57	81	(4.6)	2	25.2
ALK	**Alaska Air Group, Inc.**	6	(17)	73	56	4.5	1	24.8
PLUG	Plug Power Inc.	15	(10)	(600)	83	(1.0)	9	24.1

Ticker	Company	Market Cap (bn)	YTD Return	Sales Growth 2022	Sales Growth 2023	EPS 2022	NTM EV/ Sales	Equity duration (years)
Information Technology								
BILL	Bill.com Holdings, Inc.	$ 15	(44)%	123 %	83 %	$ 0.0	12 x	25.8
AFRM	**Affirm Holdings, Inc.**	5	(79)	NM	38	(2.8)	4	25.1
SMAR	Smartsheet, Inc.	4	(56)	43	37	(0.5)	4	24.6
WOLF	**Wolfspeed Inc**	15	7	(10)	32	(0.2)	11	24.2
SNOW	Snowflake, Inc.	57	(47)	NM	69	0.1	18	24.2
NCNO	nCino Inc	4	(35)	NM	46	(0.2)	8	24.2
FOUR	Shift4 Payments, Inc.	2	(20)	64	34	1.3	4	24.0
NEWR	New Relic, Inc.	4	(48)	16	17	(0.1)	3	23.9
MDB	**MongoDB, Inc.**	14	(60)	47	39	(0.3)	9	23.9
ESTC	**Elastic NV**	7	(39)	42	30	(0.3)	5	23.8
NET	Cloudflare Inc	17	(53)	52	48	0.0	15	23.8
ENPH	Enphase Energy, Inc.	41	66	78	63	4.1	14	23.8
PANW	**Palo Alto Networks, Inc.**	51	(8)	27	27	2.8	7	23.8
ZS	Zscaler, Inc.	25	(47)	59	49	0.9	14	23.8
CRWD	CrowdStrike Holdings, Inc.	36	(17)	67	55	1.3	13	23.7
Materials								
MP	**MP Materials Corp**	6	(30)	147	65	1.5	10	23.3
SHW	Sherwin-Williams Company	55	(39)	9	10	8.6	3	23.3
Communication Services								
SPOT	Spotify Technology SA	18	(59)	17	5	(1.8)	1	23.5
FWONA	Liberty Media Series A Formula One	28	(9)	87	23	0.4	5	23.3
ZI	**ZoomInfo Technologies Inc**	17	(35)	57	45	0.8	12	23.1
LBRDK	**Liberty Broadband Corp.**	13	(46)	1848	(2)	7.8	22	23.0
TWTR	**Twitter, Inc.**	32	(5)	37	4	1.2	6	23.0
Utilities								
AES	AES Corp.	17	7	15	1	1.6	4	23.3
BEPC	**Brookfield Renewable Corp.**	7	9	9	9	(0.3)	10	22.9
GSTHLDUR median		$ 10	(34)%	42 %	31 %	$ 0.1	5 x	24.0
Russell 1000 median		14	(19)	10	5	4.8	3	22.1

Source: FactSet, Goldman Sachs Global Investment Research

Exhibit 16: Constituents of our High Quality basket (GSTHQUAL)

Company	Ticker	Market Cap ($ bil)	Altman Z-Score	P/E (NTM)	2023E EPS Growth	Div Yield	ROE LTM	Quality Score
Communication Services (10% of the Basket)								
Alphabet Inc.	GOOGL	$ 1,336	10.5	19x	16 %	0.0%	29 %	**95**
Charter Communications	CHTR	66	0.8	11	14	0.0	42	**84**
Comcast Corp.	CMCSA	154	1.5	10	6	3.1	15	**79**
T-Mobile US Inc.	TMUS	182	1.3	31	167	0.0	11	**78**
Interpublic Grp of Cos.	IPG	11	1.5	11	(1)	4.2	29	**77**
Basket Median								**79**
Sector Median								**50**
Consumer Discretionary (12% of the Basket)								
Pool Corp.	POOL	$ 14	7.3	19x	(1)%	1.1%	70 %	**98**
O'Reilly Automotive	ORLY	48	4.0	22	12	0.0	NM	**98**
Home Depot Inc.	HD	310	7.0	18	5	2.5	NM	**96**
Dollar General	DG	57	3.5	20	11	0.9	38	**91**
Tractor Supply	TSCO	22	5.7	20	9	1.8	55	**91**
Dollar Tree Inc.	DLTR	32	3.4	20	14	0.0	22	**79**
Basket Median								**93**
Sector Median								**54**
Consumer Staples (6% of the Basket)								
Church & Dwight	CHD	$ 20	4.6	26x	8 %	1.3%	22 %	**93**
McCormick & Co.	MKC	20	2.3	26	9	1.9	17	**91**
Monster Beverage	MNST	48	26.0	33	28	0.0	19	**89**
Basket Median								**91**
Sector Median								**52**
Energy (4% of the Basket)								
Coterra Energy Inc.	CTRA	$ 23	3.5	6x	(13)%	9.0%	32 %	**59**
EOG Resources Inc.	EOG	69	4.5	7	2	2.5	26	**59**
Basket Median								**59**
Sector Median								**49**
Financials (12% of the Basket)								
First Republic Bank	FRC	$ 28	NM	17x	12 %	0.7%	13 %	**88**
Intercontinental Exchange	ICE	58	NM	19	7	1.5	10	**86**
MSCI Inc.	MSCI	39	NM	41	13	1.0	NM	**82**
Moody's Corp.	MCO	55	NM	30	16	0.9	73	**82**
Truist Financial	TFC	64	NM	9	9	4.3	12	**77**
Raymond James Financial	RJF	23	NM	12	23	1.3	18	**74**
Basket Median								**82**
Sector Median								**49**

Company	Ticker	Market Cap ($ bil)	Altman Z-Score	P/E (NTM)	2023E EPS Growth	Div Yield	ROE LTM	Quality Score
Health Care (14% of the Basket)								
IDEXX Laboratories	IDXX	$ 31	14.0	41x	20 %	0.0%	NM	**94**
Thermo Fisher Scientific	TMO	222	4.3	25	6	0.2	20	**91**
ResMed Inc.	RMD	34	14.9	37	12	0.8	24	**90**
UnitedHealth Group	UNH	495	4.2	23	15	1.3	25	**86**
West Pharmaceutical Svc.	WST	23	17.4	34	8	0.2	30	**80**
STERIS Plc	STE	21	3.4	23	7	0.9	7	**79**
Charles River Laboratories Intl	CRL	11	2.5	19	13	0.0	18	**79**
Basket Median								**86**
Sector Median								**48**
Industrials (8% of the Basket)								
Fastenal Co.	FAST	$ 29	17.4	27x	4 %	2.4%	33 %	**90**
Cintas Corp.	CTAS	44	8.8	35	8	1.1	35	**88**
Verisk Analytics	VRSK	30	5.1	32	8	0.6	29	**88**
Copart Inc.	CPRT	28	19.8	25	8	0.0	26	**87**
Basket Median								**88**
Sector Median								**54**
Information Technology (28% of the Basket)								
Accenture Plc	ACN	$ 182	7.1	25x	11 %	1.3%	33 %	**92**
CDW Corp.	CDW	24	3.4	17	8	1.1	NM	**91**
Cadence Design Systems	CDNS	47	20.0	43	12	0.0	30	**91**
EPAM Systems Inc.	EPAM	24	18.5	39	30	0.0	20	**89**
Jack Henry & Associates	JKHY	14	11.9	39	6	1.0	27	**88**
Synopsys Inc.	SNPS	51	10.3	36	16	0.0	20	**88**
Amphenol Corp.	APH	45	5.1	25	5	1.1	28	**85**
Paychex Inc.	PAYX	45	5.6	30	8	2.5	44	**84**
Tyler Technologies	TYL	16	4.9	50	9	0.0	8	**82**
Broadridge Financial Solutions	BR	20	3.4	24	9	1.7	NM	**82**
ANSYS Inc.	ANSS	22	9.6	32	11	0.0	11	**79**
Cognizant Tech Solutions	CTSH	34	6.5	14	9	1.7	19	**74**
Broadcom Inc.	AVGO	209	3.7	13	8	3.2	46	**74**
Akamai Technologies	AKAM	14	3.4	17	9	0.0	14	**74**
Basket Median								**84**
Sector Median								**55**
Materials (2% of the Basket)								
Sherwin-Williams	SHW	$ 63	3.4	25x	21 %	1.0%	73 %	**96**
Basket Median								**96**
Sector Median								**53**
Real Estate (2% of the Basket)								
American Tower	AMT	$ 122	NM	57x	(9)%	2.1%	53 %	**85**
Basket Median								**85**
Sector Median								**42**
Utilities (2% of the Basket)								
Evergy Inc.	EVRG	$ 16	NM	19x	6 %	3.3%	9 %	**84**
Basket Median								**84**
Sector Median								**50**
High Quality Stock <GSTHQUAL> Median			**5.0**	**24x**	**9 %**	**1.0%**	**26 %**	**86**
S&P 500 Median			**3.4**	**17**	**9**	**1.7**	**18**	**51**

Source: FactSet, Goldman Sachs Global Investment Research

Disclosure Appendix

Reg AC

We, David J. Kostin, Ben Snider, Ryan Hammond, Cormac Conners, Lily Calcagnini, Jenny Ma and Daniel Chavez, 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.

Unless otherwise stated, the individuals listed on the cover page of this report are analysts in Goldman Sachs' Global Investment Research division.

Disclosures

Regulatory disclosures

Disclosures required by United States laws and regulations

See company-specific regulatory disclosures above for any of the following disclosures required as to companies referred to in this report: manager or co-manager in a pending transaction; 1% or other ownership; compensation for certain services; types of client relationships; managed/co-managed public offerings in prior periods; directorships; for equity securities, market making and/or specialist role. Goldman Sachs trades or may trade as a principal in debt securities (or in related derivatives) of issuers discussed in this report.

The following are additional required disclosures: **Ownership and material conflicts of interest:** Goldman Sachs policy prohibits its analysts, professionals reporting to analysts and members of their households from owning securities of any company in the analyst's area of coverage. **Analyst compensation:** Analysts are paid in part based on the profitability of Goldman Sachs, which includes investment banking revenues. **Analyst as officer or director:** Goldman Sachs policy generally prohibits its analysts, persons reporting to analysts or members of their households from serving as an officer, director or advisor of any company in the analyst's area of coverage. **Non-U.S. Analysts:** Non-U.S. analysts may not be associated persons of Goldman Sachs & Co. LLC and therefore may not be subject to FINRA Rule 2241 or FINRA Rule 2242 restrictions on communications with subject company, public appearances and trading securities held by the analysts.

Additional disclosures required under the laws and regulations of jurisdictions other than the United States

The following disclosures are those required by the jurisdiction indicated, except to the extent already made above pursuant to United States laws and regulations. **Australia:** Goldman Sachs Australia Pty Ltd and its affiliates are not authorised deposit-taking institutions (as that term is defined in the Banking Act 1959 (Cth)) in Australia and do not provide banking services, nor carry on a banking business, in Australia. This research, and any access to it, is intended only for "wholesale clients" within the meaning of the Australian Corporations Act, unless otherwise agreed by Goldman Sachs. In producing research reports, members of the Global Investment Research Division of Goldman Sachs Australia may attend site visits and other meetings hosted by the companies and other entities which are the subject of its research reports. In some instances the costs of such site visits or meetings may be met in part or in whole by the issuers concerned if Goldman Sachs Australia considers it is appropriate and reasonable in the specific circumstances relating to the site visit or meeting. To the extent that the contents of this document contains any financial product advice, it is general advice only and has been prepared by Goldman Sachs without taking into account a client's objectives, financial situation or needs. A client should, before acting on any such advice, consider the appropriateness of the advice having regard to the client's own objectives, financial situation and needs. A copy of certain Goldman Sachs Australia and New Zealand disclosure of interests and a copy of Goldman Sachs' Australian Sell-Side Research Independence Policy Statement are available at: https://www.goldmansachs.com/disclosures/australia-new-zealand/index.html. **Brazil:** Disclosure information in relation to CVM Resolution n. 20 is available at https://www.gs.com/worldwide/brazil/area/gir/index.html. Where applicable, the Brazil-registered analyst primarily responsible for the content of this research report, as defined in Article 20 of CVM Resolution n. 20, is the first author named at the beginning of this report, unless indicated otherwise at the end of the text. **Canada:** This information is being provided to you for information purposes only and is not, and under no circumstances should be construed as, an advertisement, offering or solicitation by Goldman Sachs & Co. LLC for purchasers of securities in Canada to trade in any Canadian security. Goldman Sachs & Co. LLC is not registered as a dealer in any jurisdiction in Canada under applicable Canadian securities laws and generally is not permitted to trade in Canadian securities and may be prohibited from selling certain securities and products in certain jurisdictions in Canada. If you wish to trade in any Canadian securities or other products in Canada please contact Goldman Sachs Canada Inc., an affiliate of The Goldman Sachs Group Inc., or another registered Canadian dealer. **Hong Kong:** Further information on the securities of covered companies referred to in this research may be obtained on request from Goldman Sachs (Asia) L.L.C. **India:** Further information on the subject company or companies referred to in this research may be obtained from Goldman Sachs (India) Securities Private Limited, Research Analyst - SEBI Registration Number INH000001493, 951-A, Rational House, Appasaheb Marathe Marg, Prabhadevi, Mumbai 400 025, India, Corporate Identity Number U74140MH2006FTC160634, Phone +91 22 6616 9000, Fax +91 22 6616 9001. Goldman Sachs may beneficially own 1% or more of the securities (as such term is defined in clause 2 (h) the Indian Securities Contracts (Regulation) Act, 1956) of the subject company or companies referred to in this research report. **Japan:** See below. **Korea:** This research, and any access to it, is intended only for "professional investors" within the meaning of the Financial Services and Capital Markets Act, unless otherwise agreed by Goldman Sachs. Further information on the subject company or companies referred to in this research may be obtained from Goldman Sachs (Asia) L.L.C., Seoul Branch. **New Zealand:** Goldman Sachs New Zealand Limited and its affiliates are neither "registered banks" nor "deposit takers" (as defined in the Reserve Bank of New Zealand Act 1989) in New Zealand. This research, and any access to it, is intended for "wholesale clients" (as defined in the Financial Advisers Act 2008) unless otherwise agreed by Goldman Sachs. A copy of certain Goldman Sachs Australia and New Zealand disclosure of interests is available at: https://www.goldmansachs.com/disclosures/australia-new-zealand/index.html. **Russia:** Research reports distributed in the Russian Federation are not advertising as defined in the Russian legislation, but are information and analysis not having product promotion as their main purpose and do not provide appraisal within the meaning of the Russian legislation on appraisal activity. Research reports do not constitute a personalized investment recommendation as defined in Russian laws and regulations, are not addressed to a specific client, and are prepared without analyzing the financial circumstances, investment profiles or risk profiles of clients. Goldman Sachs assumes no responsibility for any investment decisions that may be taken by a client or any other person based on this research report. **Singapore:** Goldman Sachs (Singapore) Pte. (Company Number: 198602165W), which is regulated by the Monetary Authority of Singapore, accepts legal responsibility for this research, and should be contacted with respect to any matters arising from, or in connection with, this research. **Taiwan:** This material is for reference only and must not be reprinted without permission. Investors should carefully consider their own investment risk. Investment results are the responsibility of the individual investor. **United Kingdom:** Persons who would be categorized as retail clients in the United Kingdom, as such term is defined in the rules of the Financial Conduct Authority, should read this research in conjunction with prior Goldman Sachs research on the covered companies referred to herein and should refer to the risk warnings that have been sent to them by Goldman Sachs International. A copy of these risks warnings, and a glossary of certain financial terms used in this report, are available from Goldman Sachs International on request.

European Union and United Kingdom: Disclosure information in relation to Article 6 (2) of the European Commission Delegated Regulation (EU) (2016/958) supplementing Regulation (EU) No 596/2014 of the European Parliament and of the Council (including as that Delegated Regulation is implemented into United Kingdom domestic law and regulation following the United Kingdom's departure from the European Union and the European Economic Area) with regard to regulatory technical standards for the technical arrangements for objective presentation of investment recommendations or other information recommending or suggesting an investment strategy and for disclosure of particular interests or indications of conflicts of interest is available at https://www.gs.com/disclosures/europeanpolicy.html which states the European Policy for Managing Conflicts of Interest in Connection with Investment Research.

Japan: Goldman Sachs Japan Co., Ltd. is a Financial Instrument Dealer registered with the Kanto Financial Bureau under registration number Kinsho 69, and a member of Japan Securities Dealers Association, Financial Futures Association of Japan and Type II Financial Instruments Firms Association. Sales and purchase of equities are subject to commission pre-determined with clients plus consumption tax. See company-specific disclosures as to any applicable disclosures required by Japanese stock exchanges, the Japanese Securities Dealers Association or the Japanese Securities Finance Company.

Global product; distributing entities

The Global Investment Research Division of Goldman Sachs produces and distributes research products for clients of Goldman Sachs on a global basis. Analysts based in Goldman Sachs offices around the world produce research on industries and companies, and research on macroeconomics, currencies, commodities and portfolio strategy. This research is disseminated in Australia by Goldman Sachs Australia Pty Ltd (ABN 21 006 797 897); in Brazil by Goldman Sachs do Brasil Corretora de Títulos e Valores Mobiliários S.A.; Public Communication Channel Goldman Sachs Brazil: 0800 727 5764 and / or contatogoldmanbrasil@gs.com. Available Weekdays (except holidays), from 9am to 6pm. Canal de Comunicação com o Público Goldman Sachs Brasil: 0800 727 5764 e/ou contatogoldmanbrasil@gs.com. Horário de funcionamento: segunda-feira à sexta-feira (exceto feriados), das 9h às 18h; in Canada by Goldman Sachs & Co. LLC; in Hong Kong by Goldman Sachs (Asia) L.L.C.; in India by Goldman Sachs (India) Securities Private Ltd.; in Japan by Goldman Sachs Japan Co., Ltd.; in the Republic of Korea by Goldman Sachs (Asia) L.L.C., Seoul Branch; in New Zealand by Goldman Sachs New Zealand Limited; in Russia by OOO Goldman Sachs; in Singapore by Goldman Sachs (Singapore) Pte. (Company Number: 198602165W); and in the United States of America by Goldman Sachs & Co. LLC. Goldman Sachs International has approved this research in connection with its distribution in the United Kingdom.

Effective from the date of the United Kingdom's departure from the European Union and the European Economic Area ("Brexit Day") the following information with respect to distributing entities will apply:

Goldman Sachs International ("GSI"), authorised by the Prudential Regulation Authority ("PRA") and regulated by the Financial Conduct Authority ("FCA") and the PRA, has approved this research in connection with its distribution in the United Kingdom.

European Economic Area: GSI, authorised by the PRA and regulated by the FCA and the PRA, disseminates research in the following jurisdictions within the European Economic Area: the Grand Duchy of Luxembourg, Italy, the Kingdom of Belgium, the Kingdom of Denmark, the Kingdom of Norway, the Republic of Finland, the Republic of Cyprus and the Republic of Ireland; GS -Succursale de Paris (Paris branch) which, from Brexit Day, will be authorised by the French Autorité de contrôle prudentiel et de resolution ("ACPR") and regulated by the Autorité de contrôle prudentiel et de resolution and the Autorité des marches financiers ("AMF") disseminates research in France; GSI - Sucursal en España (Madrid branch) authorized in Spain by the Comisión Nacional del Mercado de Valores disseminates research in the Kingdom of Spain; GSI - Sweden Bankfilial (Stockholm branch) is authorized by the SFSA as a "third country branch" in accordance with Chapter 4, Section 4 of the Swedish Securities and Market Act (Sw. lag (2007:528) om värdepappersmarknaden) disseminates research in the Kingdom of Sweden; Goldman Sachs Bank Europe SE ("GSBE") is a credit institution incorporated in Germany and, within the Single Supervisory Mechanism, subject to direct prudential supervision by the European Central Bank and in other respects supervised by German Federal Financial Supervisory Authority (Bundesanstalt für Finanzdienstleistungsaufsicht, BaFin) and Deutsche Bundesbank and disseminates research in the Federal Republic of Germany and those jurisdictions within the European Economic Area where GSI is not authorised to disseminate research and additionally, GSBE, Copenhagen Branch filial af GSBE, Tyskland, supervised by the Danish Financial Authority disseminates research in the Kingdom of Denmark; GSBE - Sucursal en España (Madrid branch) subject (to a limited extent) to local supervision by the Bank of Spain disseminates research in the Kingdom of Spain; GSBE - Succursale Italia (Milan branch) to the relevant applicable extent, subject to local supervision by the Bank of Italy (Banca d'Italia) and the Italian Companies and Exchange Commission (Commissione Nazionale per le Società e la Borsa "Consob") disseminates research in Italy; GSBE - Succursale de Paris (Paris branch), supervised by the AMF and by the ACPR disseminates research in France; and GSBE - Sweden Bankfilial (Stockholm branch), to a limited extent, subject to local supervision by the Swedish Financial Supervisory Authority (Finansinpektionen) disseminates research in the Kingdom of Sweden.

General disclosures

This research is for our clients only. Other than disclosures relating to Goldman Sachs, this research is based on current public information that we consider reliable, but we do not represent it is accurate or complete, and it should not be relied on as such. The information, opinions, estimates and forecasts contained herein are as of the date hereof and are subject to change without prior notification. We seek to update our research as appropriate, but various regulations may prevent us from doing so. Other than certain industry reports published on a periodic basis, the large majority of reports are published at irregular intervals as appropriate in the analyst's judgment.

Goldman Sachs conducts a global full-service, integrated investment banking, investment management, and brokerage business. We have investment banking and other business relationships with a substantial percentage of the companies covered by our Global Investment Research Division. Goldman Sachs & Co. LLC, the United States broker dealer, is a member of SIPC (https://www.sipc.org).

Our salespeople, traders, and other professionals may provide oral or written market commentary or trading strategies to our clients and principal trading desks that reflect opinions that are contrary to the opinions expressed in this research. Our asset management area, principal trading desks and investing businesses may make investment decisions that are inconsistent with the recommendations or views expressed in this research.

We and our affiliates, officers, directors, and employees, will from time to time have long or short positions in, act as principal in, and buy or sell, the securities or derivatives, if any, referred to in this research, unless otherwise prohibited by regulation or Goldman Sachs policy.

The views attributed to third party presenters at Goldman Sachs arranged conferences, including individuals from other parts of Goldman Sachs, do not necessarily reflect those of Global Investment Research and are not an official view of Goldman Sachs.

Any third party referenced herein, including any salespeople, traders and other professionals or members of their household, may have positions in the products mentioned that are inconsistent with the views expressed by analysts named in this report.

This research is focused on investment themes across markets, industries and sectors. It does not attempt to distinguish between the prospects or performance of, or provide analysis of, individual companies within any industry or sector we describe.

Any trading recommendation in this research relating to an equity or credit security or securities within an industry or sector is reflective of the investment theme being discussed and is not a recommendation of any such security in isolation.

This research is not an offer to sell or the solicitation of an offer to buy any security in any jurisdiction where such an offer or solicitation would be illegal. It does not constitute a personal recommendation or take into account the particular investment objectives, financial situations, or needs of individual clients. Clients should consider whether any advice or recommendation in this research is suitable for their particular circumstances and, if appropriate, seek professional advice, including tax advice. The price and value of investments referred to in this research and the income from them may fluctuate. Past performance is not a guide to future performance, future returns are not guaranteed, and a loss of original capital may occur.

Fluctuations in exchange rates could have adverse effects on the value or price of, or income derived from, certain investments.

Certain transactions, including those involving futures, options, and other derivatives, give rise to substantial risk and are not suitable for all investors. Investors should review current options and futures disclosure documents which are available from Goldman Sachs sales representatives or at https://www.theocc.com/about/publications/character-risks.jsp and https://www.fiadocumentation.org/fia/regulatory-disclosures_1/fia-uniform-futures-and-options-on-futures-risk-disclosures-booklet-pdf-version-2018. Transaction costs may be significant in option strategies calling for multiple purchase and sales of options such as spreads. Supporting documentation will be supplied upon request.

Differing Levels of Service provided by Global Investment Research: The level and types of services provided to you by the Global Investment Research division of GS may vary as compared to that provided to internal and other external clients of GS, depending on various factors including your individual preferences as to the frequency and manner of receiving communication, your risk profile and investment focus and perspective (e.g., marketwide, sector specific, long term, short term), the size and scope of your overall client relationship with GS, and legal and regulatory constraints. As an example, certain clients may request to receive notifications when research on specific securities is published, and certain clients may request that specific data underlying analysts' fundamental analysis available on our internal client websites be delivered to them electronically through data feeds or otherwise. No change to an analyst's fundamental research views (e.g., ratings, price targets, or material changes to earnings estimates for equity securities), will be communicated to any client prior to inclusion of such information in a research report broadly disseminated through electronic publication to our internal client websites or through other means, as necessary, to all clients who are entitled to receive such reports.

All research reports are disseminated and available to all clients simultaneously through electronic publication to our internal client websites. Not all research content is redistributed to our clients or available to third-party aggregators, nor is Goldman Sachs responsible for the redistribution of our research by third party aggregators. For research, models or other data related to one or more securities, markets or asset classes (including related services) that may be available to you, please contact your GS representative or go to https://research.gs.com.

Disclosure information is also available at https://www.gs.com/research/hedge.html or from Research Compliance, 200 West Street, New York, NY 10282.