



Global Investment Research

The Goldman Sachs Group, Inc.

Where to Invest Now

Prepare for landing

October 4, 2022

David J. Kostin
Chief US Equity Strategist

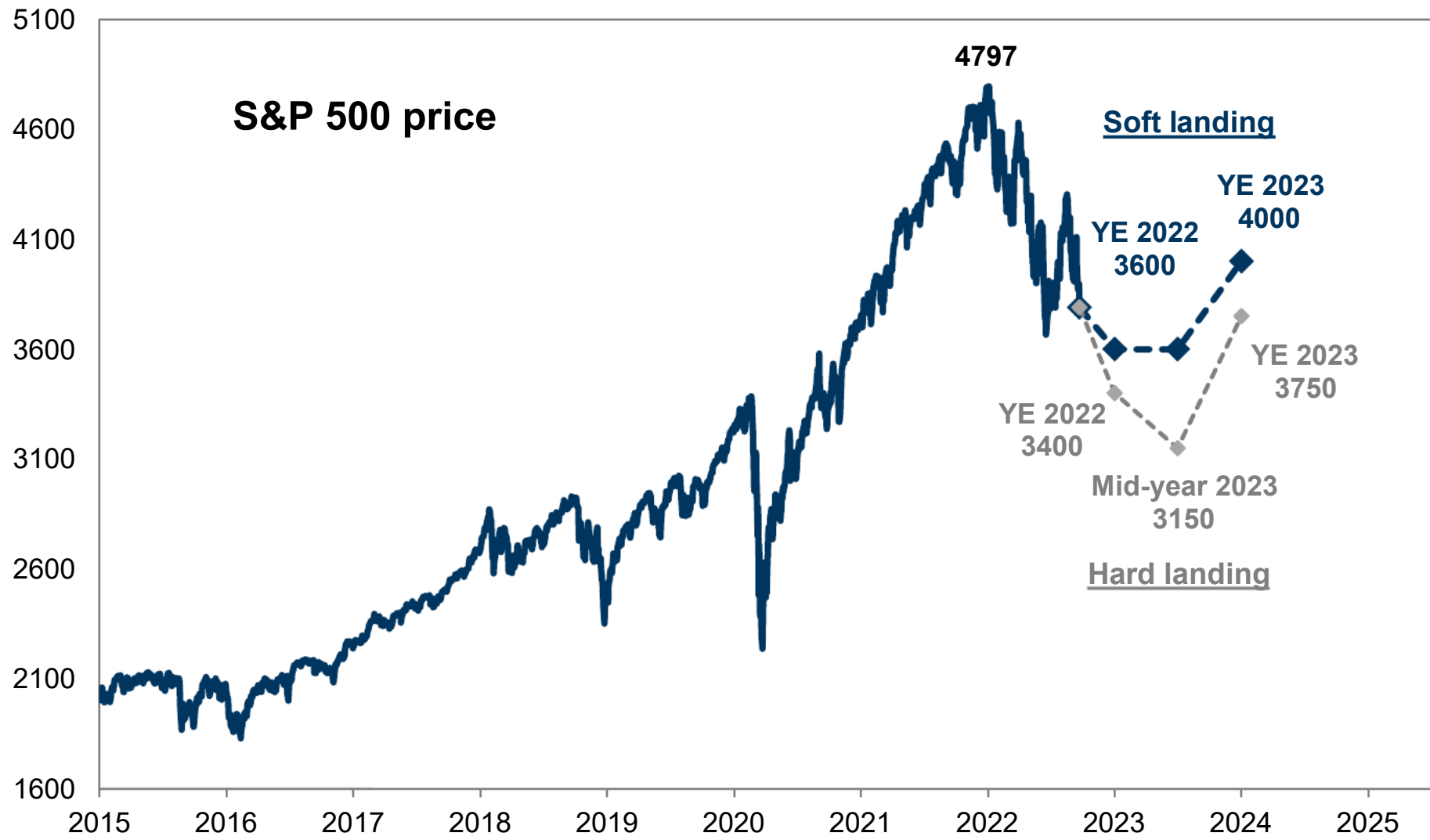
Goldman, Sachs & Co.

1-212-902-6781

david.kostin@gs.com

Path of S&P 500: Soft vs. Hard landing scenarios

S&P 500 falls to 3600 in soft landing, but 3150 if investors price hard landing



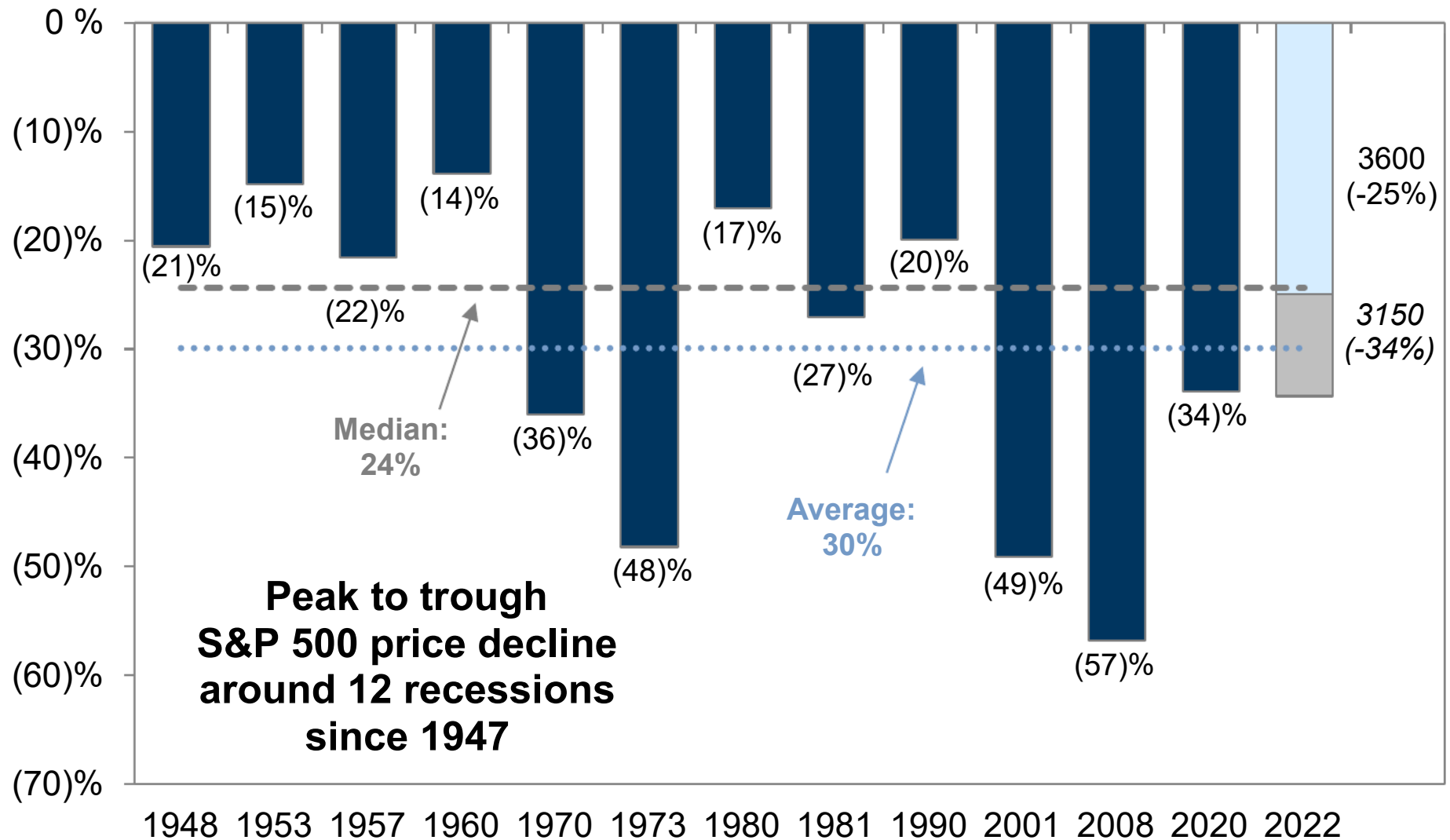
Two scenarios for S&P 500 price target and P/E

Our baseline “soft landing” forecast assumes yields rise and P/E falls to 15x

| | 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 |
| <i>Growth vs. 2022</i> | 3 % | 3 % | 3 % | (11)% | (11)% | (11)% |
| 2024 | 243 | 243 | 243 | 230 | 230 | 230 |
| <i>Growth vs. 2023</i> | 4 % | 4 % | 4 % | 15 % | 15 % | 15 % |
| Market pricing of NTM EPS | \$234 | \$238 | \$243 | \$230 | \$220 | \$225 |
| <i>Growth rate</i> | 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 |
| <i>%ile rank since 1990</i> | 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 |
| <i>%ile rank since 1990</i> | 52 % | 46 % | 67 % | 41 % | 35 % | 70 % |
| S&P 500 level | 3600 | 3600 | 4000 | 3400 | 3150 | 3750 |
| <i>Change from current</i> | (2)% | (2)% | 9 % | (8)% | (14)% | 2 % |

In a hard landing, S&P 500 could fall by 34% to 3150

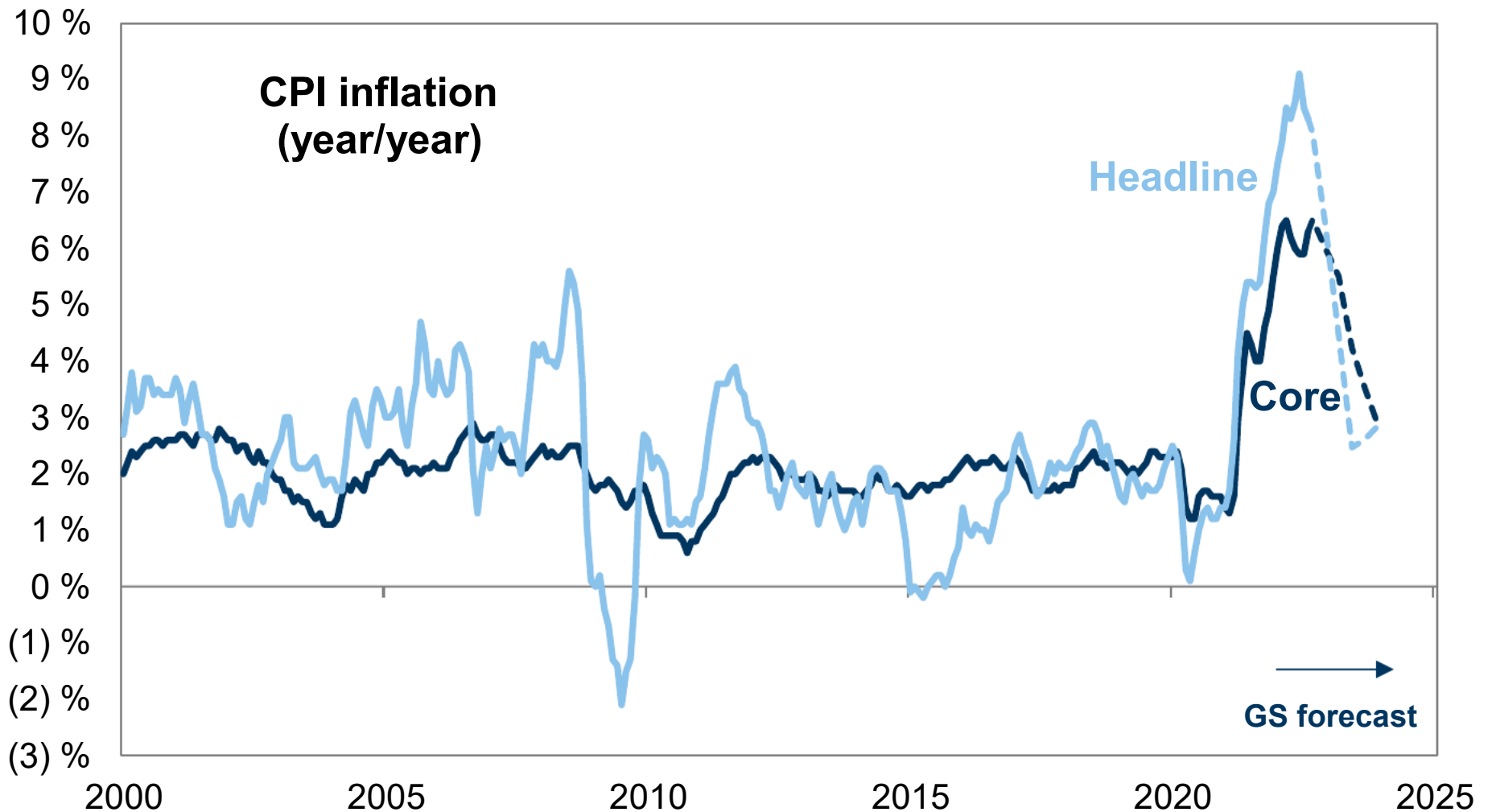
S&P 500 peak-to-trough decline averages 30% during recessions



Economy and recession risk

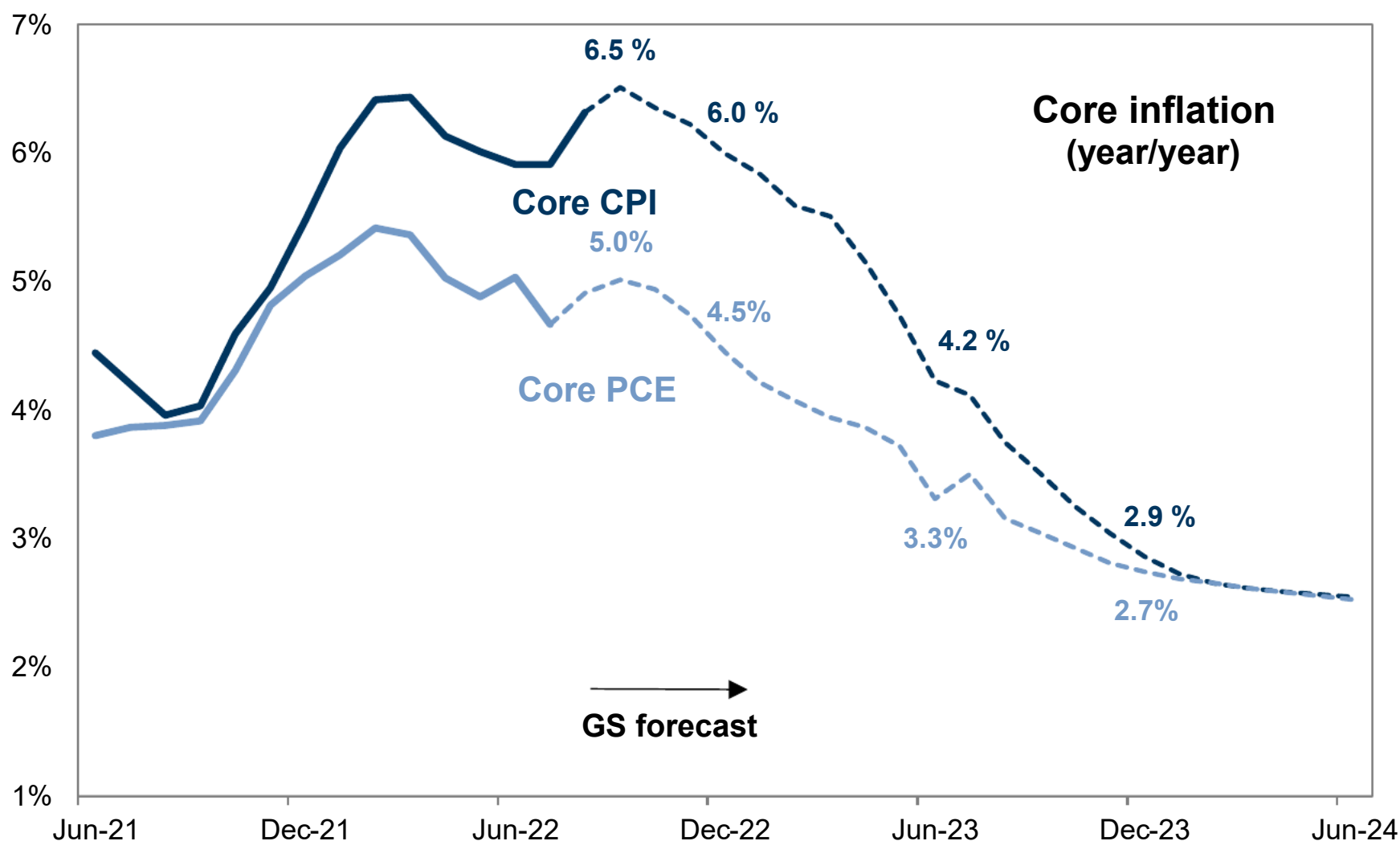
Inflation has stayed high, but is forecast to decelerate

GS Economics forecasts core CPI will end 2022 at 6.0% and 2023 at 2.9%



Inflation is likely to stay elevated into year end 2022

Our economists expect Core PCE will decline from 4.9% to 2.7% by end of 2023



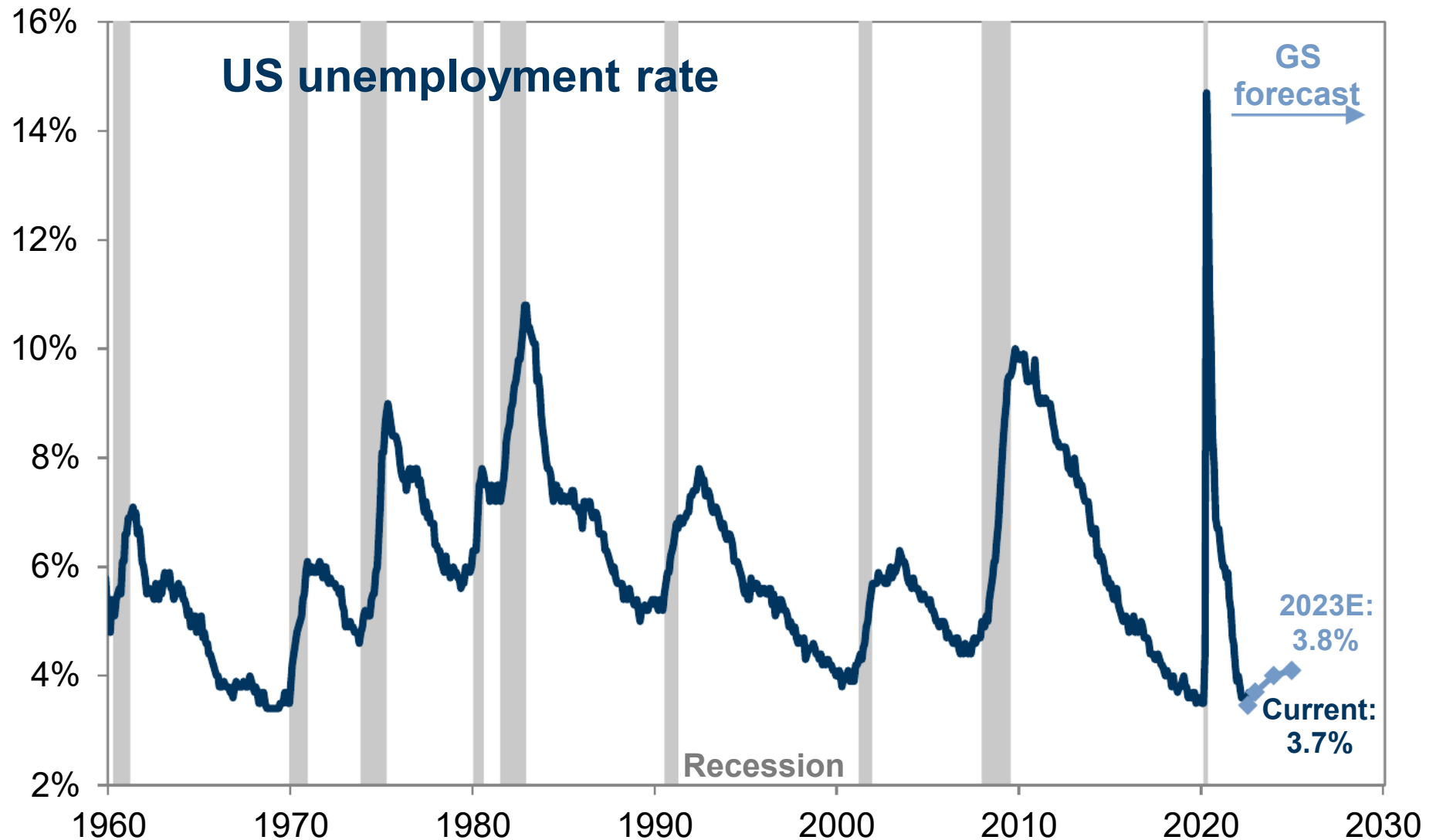
GS Economics expects core PCE will decelerate

Goods inflation decelerating sharply while Services inflation remains elevated

| | Weight | GS Economics Core PCE Forecast (Year/Year) | | | |
|--------------------------------|--------------|--|------------|------------|--------------|
| | | Dec. 2021 | Aug. 22 | Dec. 2022 | Dec. 2023 |
| Core PCE | 100.0 | 4.9 | 4.9 | 4.5 | 2.7 |
| Core Goods | 27.3 | 6.8 | 5.6 | 4.1 | (1.6) |
| Pharma & Medical | 4.1 | 0.0 | 3.6 | 3.3 | (0.4) |
| Clothing & Footwear | 3.2 | 5.0 | 5.4 | 4.5 | 0.7 |
| Video, Audio, Computers | 2.5 | (0.6) | (3.3) | (3.1) | (4.9) |
| New Vehicles | 2.3 | 11.9 | 10.0 | 7.1 | (2.1) |
| Used Vehicles | 1.7 | 48.4 | 7.7 | (3.0) | (17.0) |
| Jewelry, Watches | 0.7 | 8.8 | (0.7) | 0.3 | 0.4 |
| Recreational Vehicles | 0.7 | 6.2 | 1.8 | 2.7 | 1.0 |
| Pets Products | 0.6 | 2.7 | 10.7 | 11.4 | 3.2 |
| Household Appliances | 0.5 | 8.0 | 2.4 | (0.4) | (0.0) |
| Expenditures Abroad | 0.1 | 2.2 | (0.8) | (1.1) | (2.6) |
| Residual Core Goods | 10.8 | 4.9 | 7.8 | 6.6 | (0.3) |
| Core Services | 72.7 | 4.2 | 4.7 | 4.6 | 4.2 |
| Medical Services | 17.8 | 2.7 | 2.5 | 2.5 | 4.0 |
| Housing | 16.9 | 3.7 | 6.4 | 7.0 | 4.9 |
| Financial Services & Insurance | 8.5 | 3.5 | (0.6) | (1.4) | 3.2 |
| Food Services & Accommodation | 8.2 | 6.2 | 7.2 | 6.3 | 4.6 |
| Foreign Travel | 1.4 | 3.7 | 6.8 | 9.2 | 3.5 |
| Air Transportation | 1.1 | 24.0 | 22.4 | 15.5 | 0.7 |
| Ground Transportation | 0.4 | 3.4 | 0.2 | 2.2 | 1.8 |
| Residual Core Services | 18.6 | 5.1 | 5.7 | 5.7 | 4.3 |

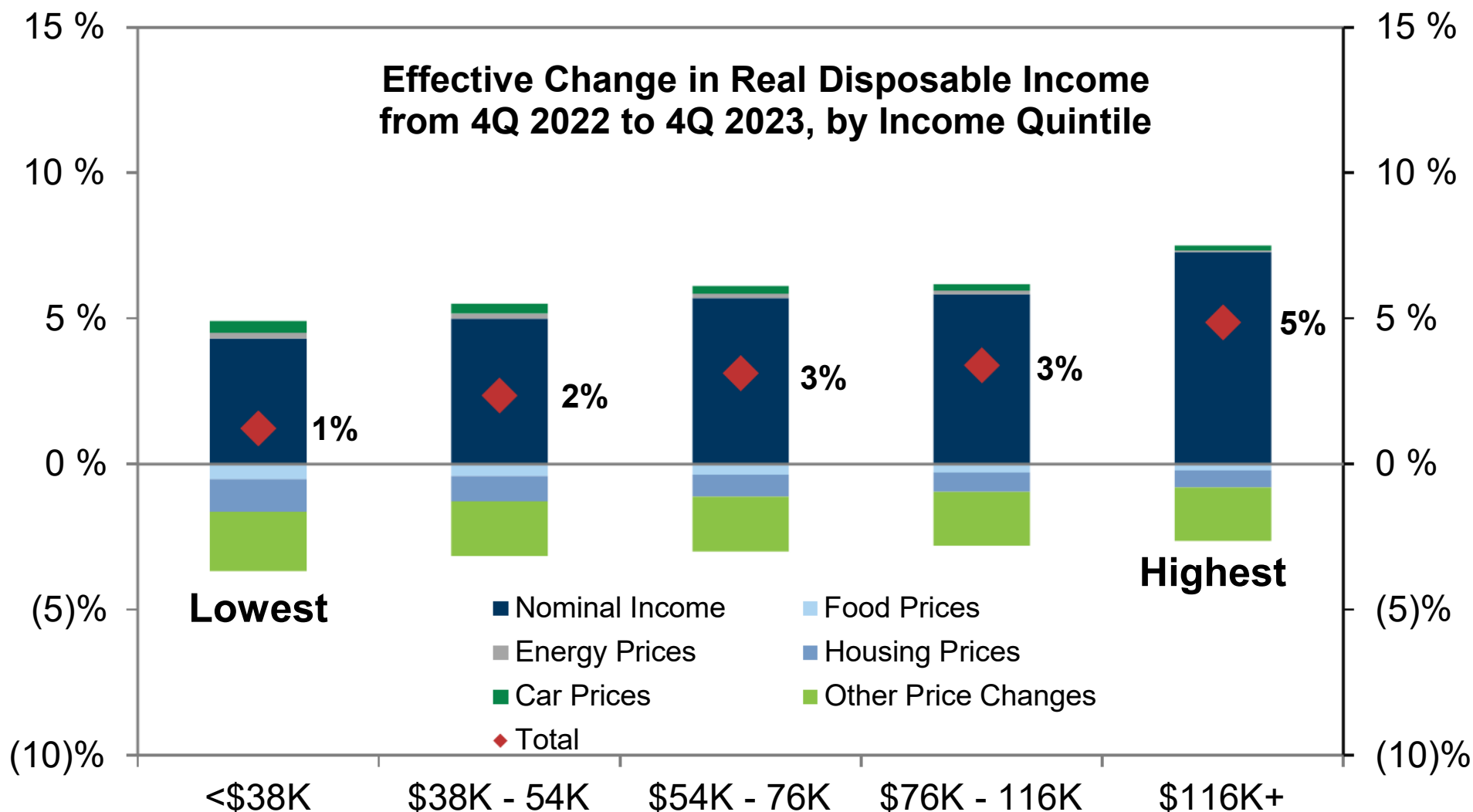
US unemployment rate of 3.7% is near record low

A 0.3 pp rise in the unemployment rate has been associated with recessions



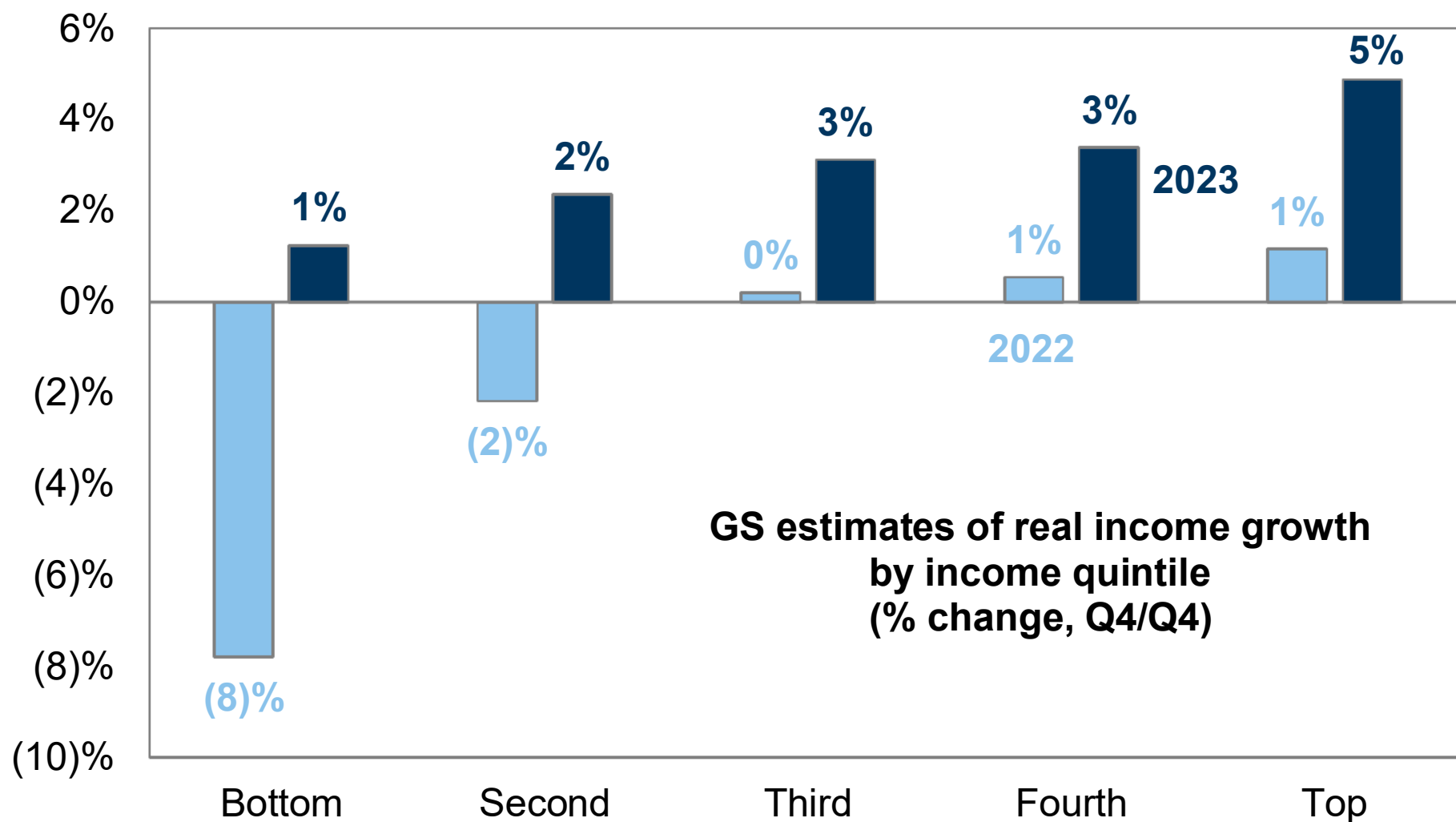
Effective change in real disposable income

All income quintiles should show positive real disposable income growth in 2023



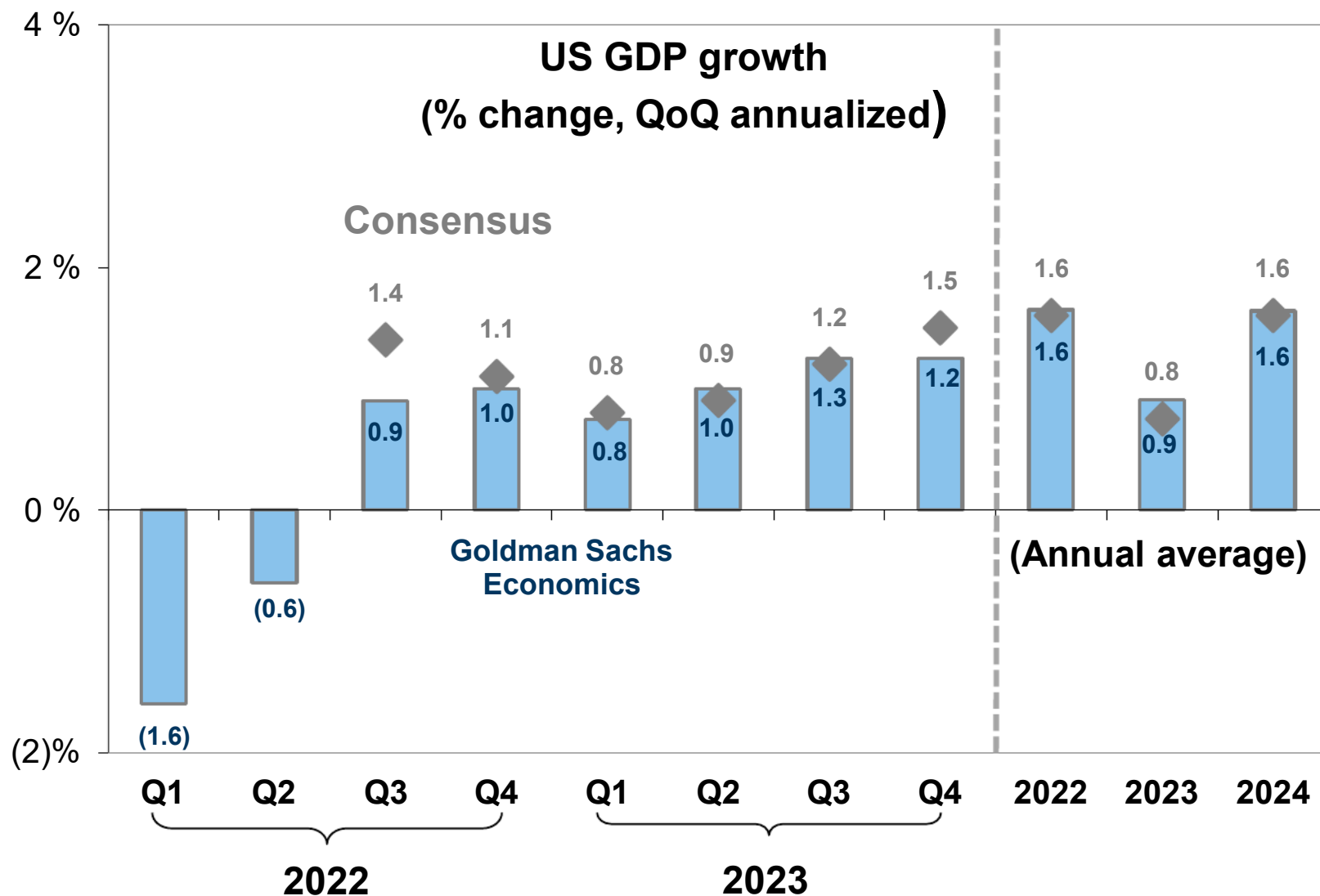
Real disposable income growth: 2022 vs. 2023E

Goldman Sachs Economics forecasts growth for all income quintiles in 2023



US GDP growth: Goldman Sachs vs. consensus

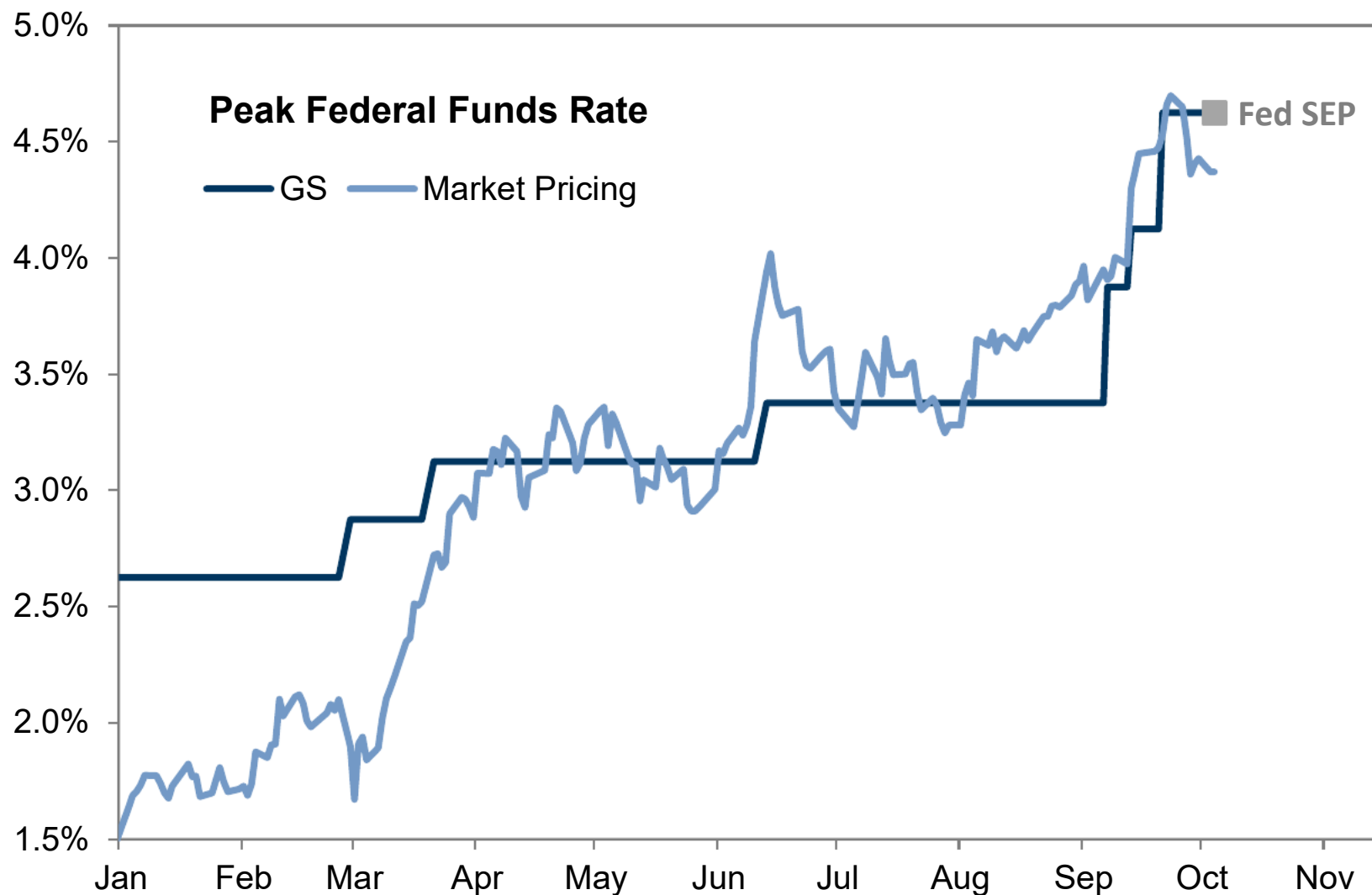
GS Economics assigns a 35% probability of a US recession in next 12 months



Rates and equities

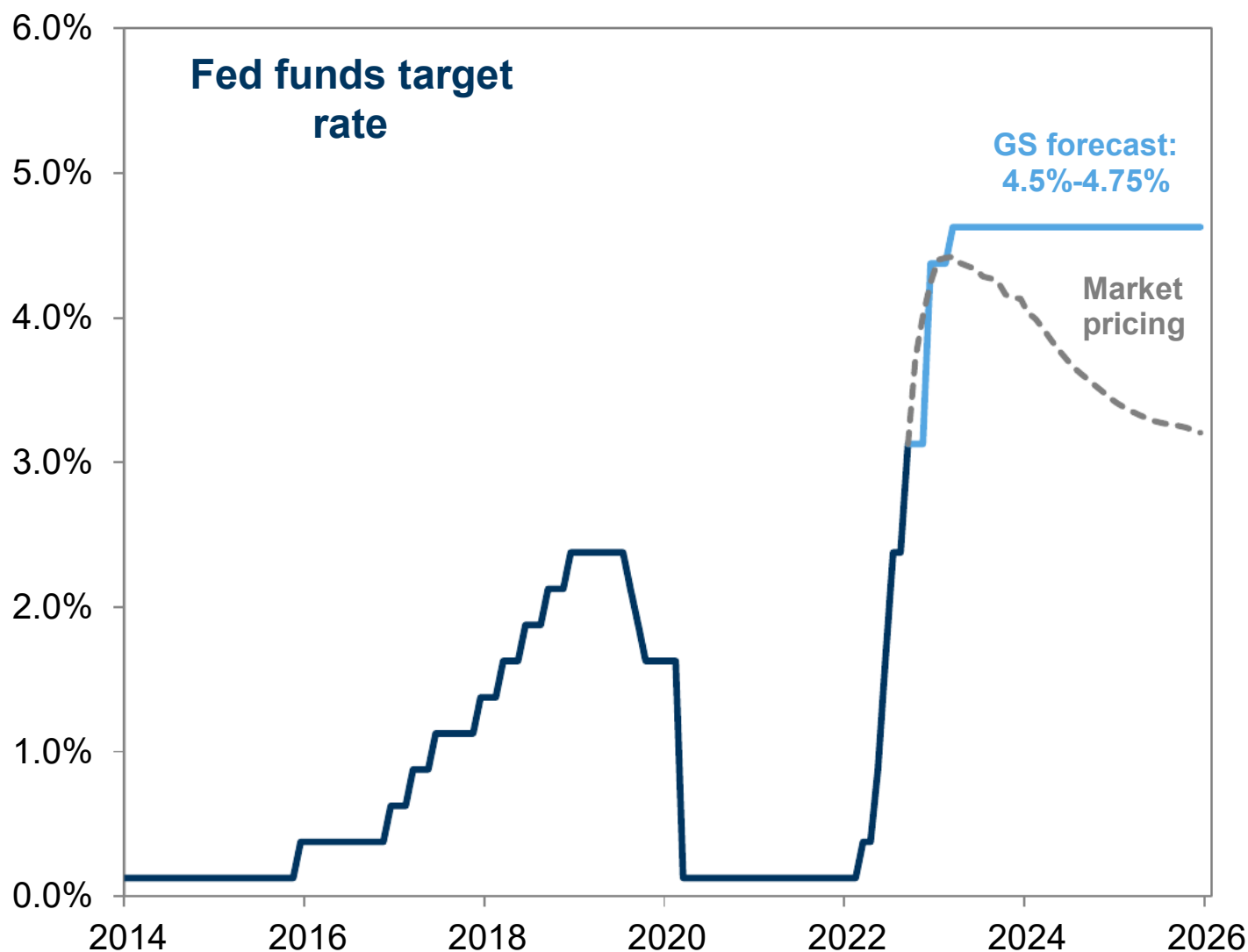
Sharp repricing in the peak federal funds rate

Persistent inflation has led to greater expectations of Fed tightening



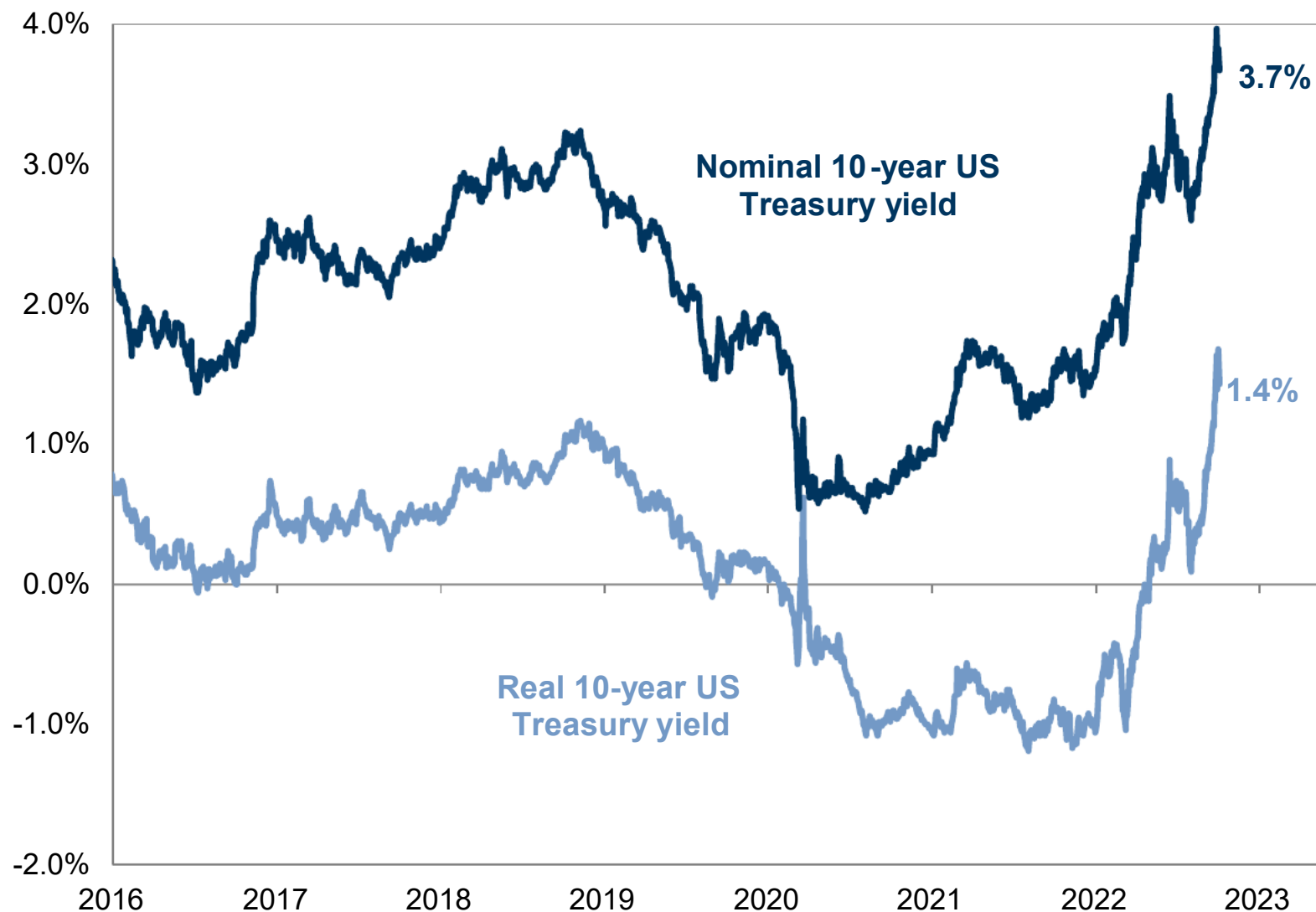
Fed funds in 2022 will jump from ¼% to nearly 5%

Goldman Sachs Economics forecasts terminal rate of 4.5%-4.75% by 2022 YE



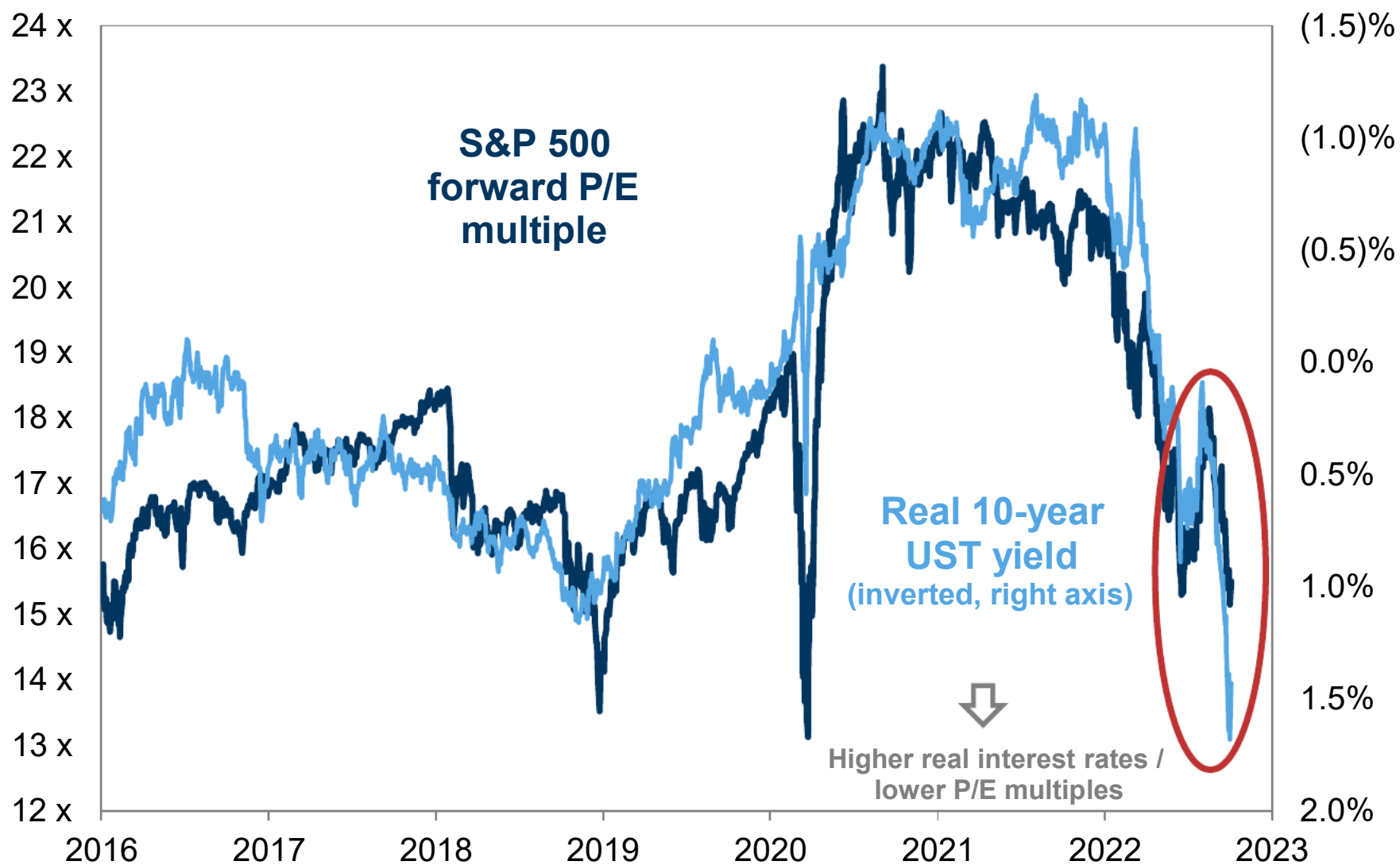
Real rates and nominal rates have both surged YTD

Inflation and hawkish Fed pushed real rates from -1.0% in March to +1.4% today



S&P 500 P/E multiple vs. real 10-year Treasury yield

Equity valuations have declined as real interest rates have climbed



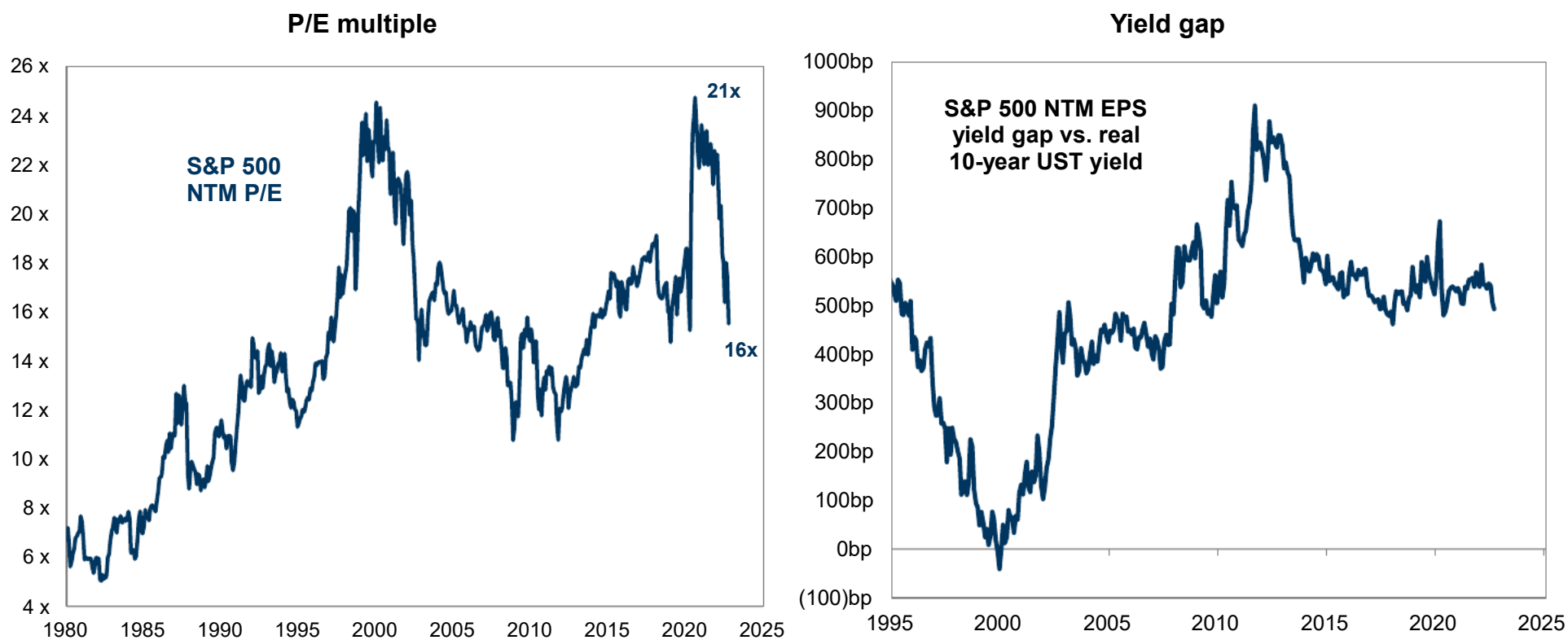
Implied S&P 500 P/E based on rates and yield gap

Baseline assumes stable rates and yield gap; rising real rates implies lower P/E

| 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% |
| | Current | 450 bp | 20x 4700 | 18x 4250 | 17x 3900 | 15x 3600 | 14x 3350 |
| | | 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 |

Absolute and relative valuation of equities

S&P 500 P/E multiple compressed by 27% from 21x in January to 16x today



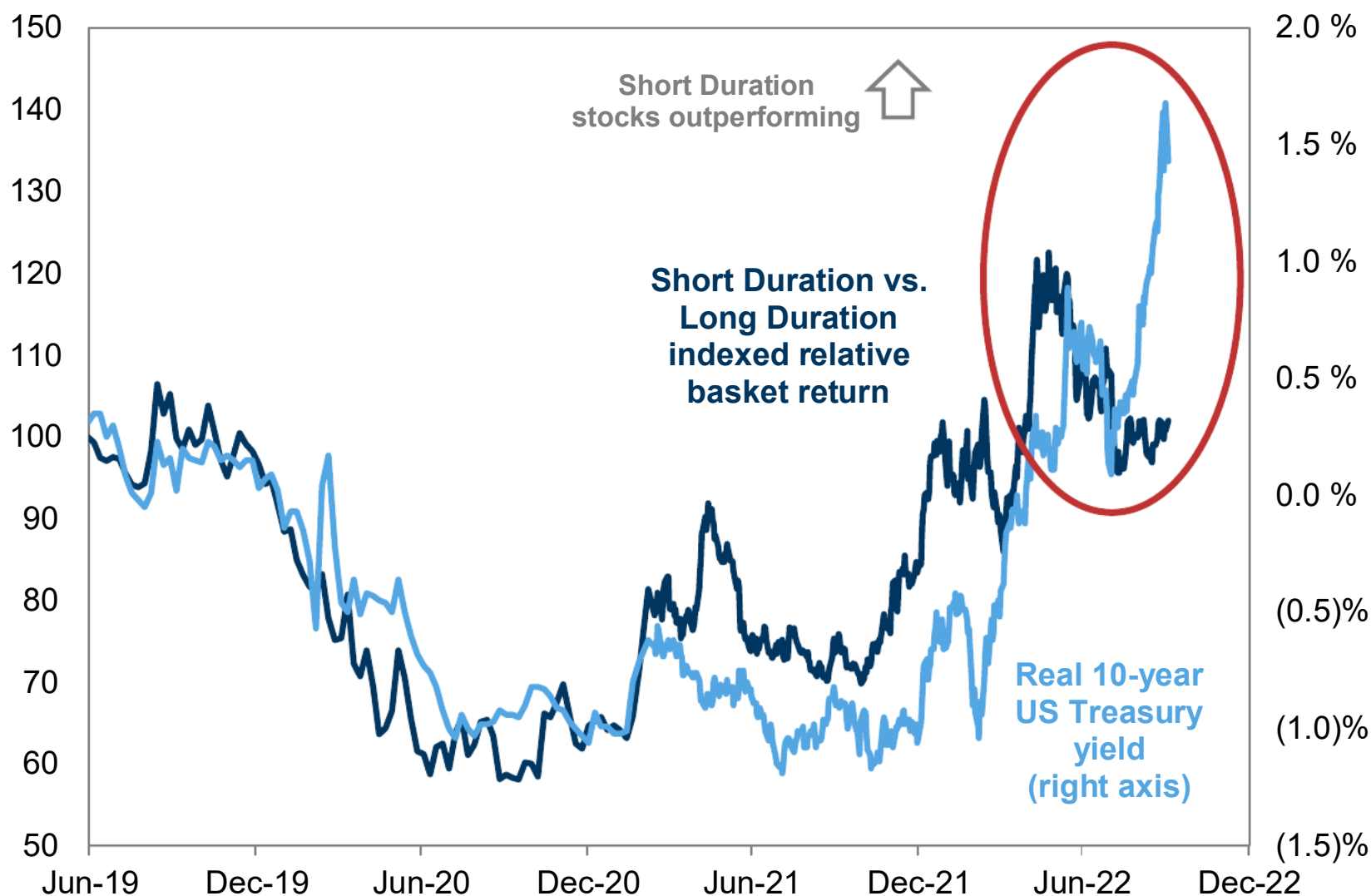
Absolute and relative valuations for equities differ

Median absolute valuation metric at 80th percentile while relative at 74th

| Valuation metric | Aggregate index | |
|--------------------------------|-----------------|-----------------|
| | Current | Historical %ile |
| US market cap / GDP | 204 % | 95 % |
| EV / sales | 2.4 x | 92 |
| Price / book | 3.6 x | 87 |
| Cash flow yield (CFO) | 7.3 % | 80 |
| EV / EBITDA | 11.6 x | 79 |
| Cyclically adjusted P/E (CAPE) | 24.0 x | 77 |
| Forward P/E | 15.8 x | 66 |
| Free cash flow yield | 4.6 % | 31 |
| Median absolute metric | | 80 % |
| Yield gap vs. real 10-year UST | 478 bp | 75 |
| Yield gap vs. IG | 72 bp | 74 |
| Yield gap vs. 10-year UST | 239 bp | 50 |
| Median relative metric | | 74 % |

Long vs. short duration trade has followed real yields

Short duration equities typically outperform as real rates rise



Short Duration basket (GSTHSDUR)

Median constituent's duration equals 18 years (vs. 24 years for GSTHLDUR)

| 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 | Viatis, 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 |
| GATES | 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 SYNEX 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 |
| GPNI | 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 | | | | | | | | |
| | | 13 | (19) | 10 | 5 | 4.6 | 3 | 22.1 |

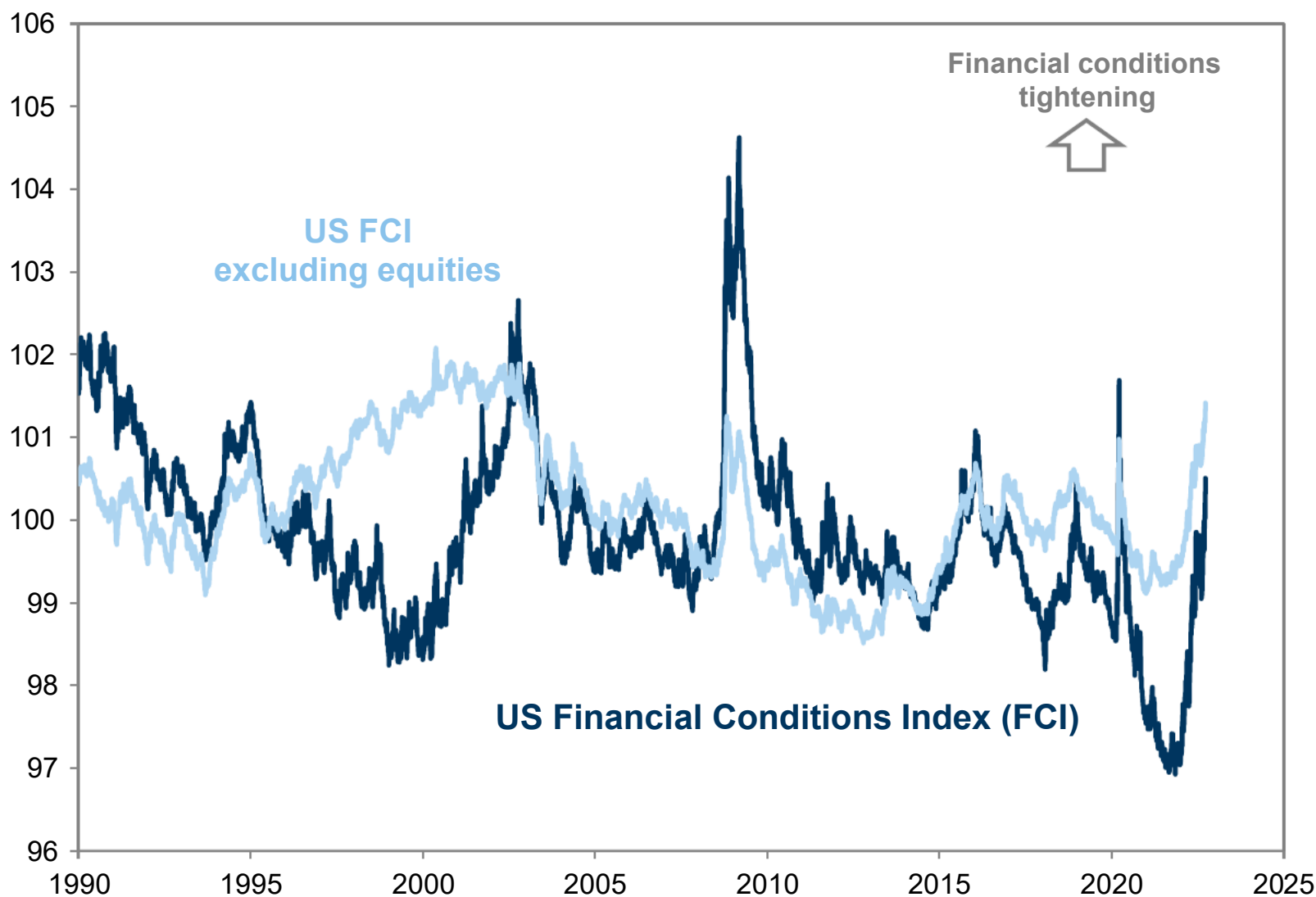
Long Duration basket (GSTHLDUR)

Median basket constituent's equity duration is 24 years (vs. 22 for Russel 1000)

| 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 |
| TDOD | 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 |
| 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 |
| NEWB | 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 |
| Summary | | | | | | | | |
| GSTHLDUR median | | \$ 10 | (34)% | 42 % | 31 % | \$ 0.1 | 5 x | 24.0 |
| Russell 1000 median | | 13 | (19) | 10 | 5 | 4.6 | 3 | 22.1 |

Financial Conditions Index (FCI) has tightened

Higher Treasury yields, wider credit spreads, and lower P/E multiples



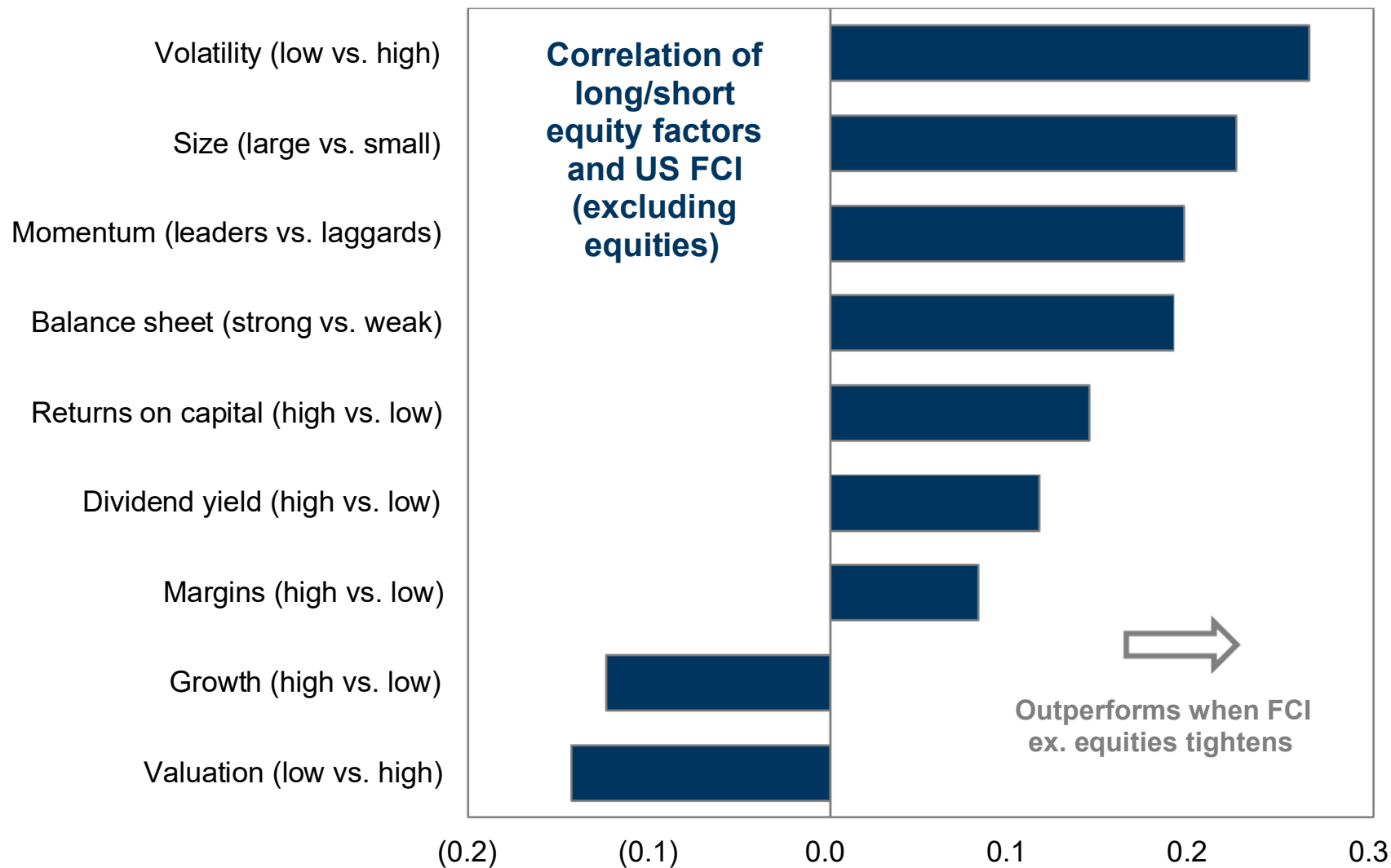
FCI sensitivity to its various component variables

20% decline in cyclically-adjusted P/E multiple tightens FCI by 100 bp

| GS US FCI components | | | |
|------------------------------|------------------|---|-----------------------|
| Variable | Component Weight | <i>Ceteris paribus</i> change in variable required to tighten US FCI by 100 bp | 2022 YTD change |
| Nominal Treasury yields | 45.1 % | 220 bp increase | 252 bp |
| Corporate credit spreads | 39.6 | 250 bp widening | 56 bp |
| Trade-weighted exchange rate | 6.0 | 16.7% appreciation | 12% |
| Equity valuations | 4.9 | 20.4% decline | -31% |
| Nominal fed funds rate | 4.4 | 22.7 pp increase | 3.0 pp |
| Total | 100.0 % | | 364 bp |

Quality factors typically outperform as FCI tightens

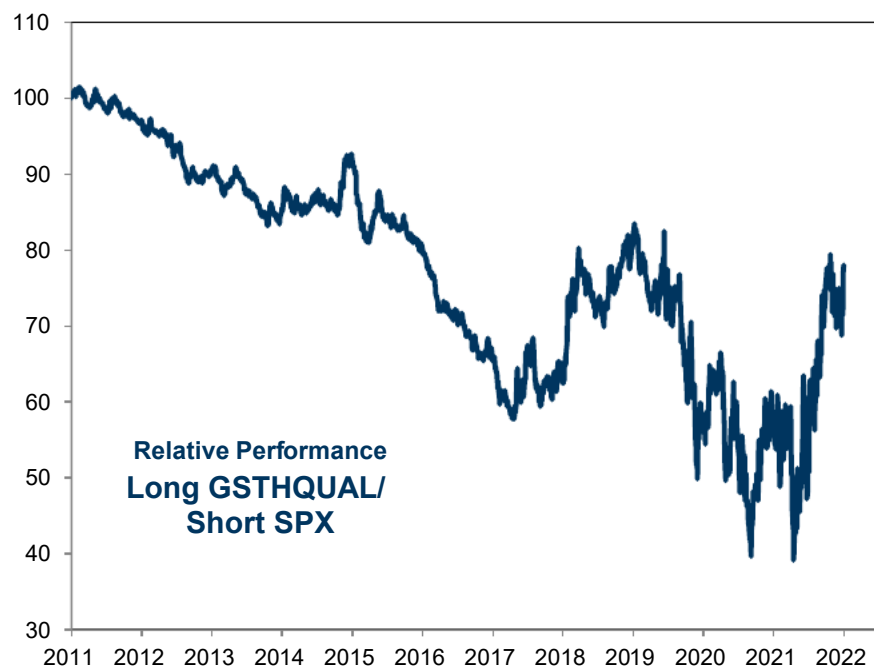
Stocks with low volatility, strong balance sheets, or returns on capital outperform



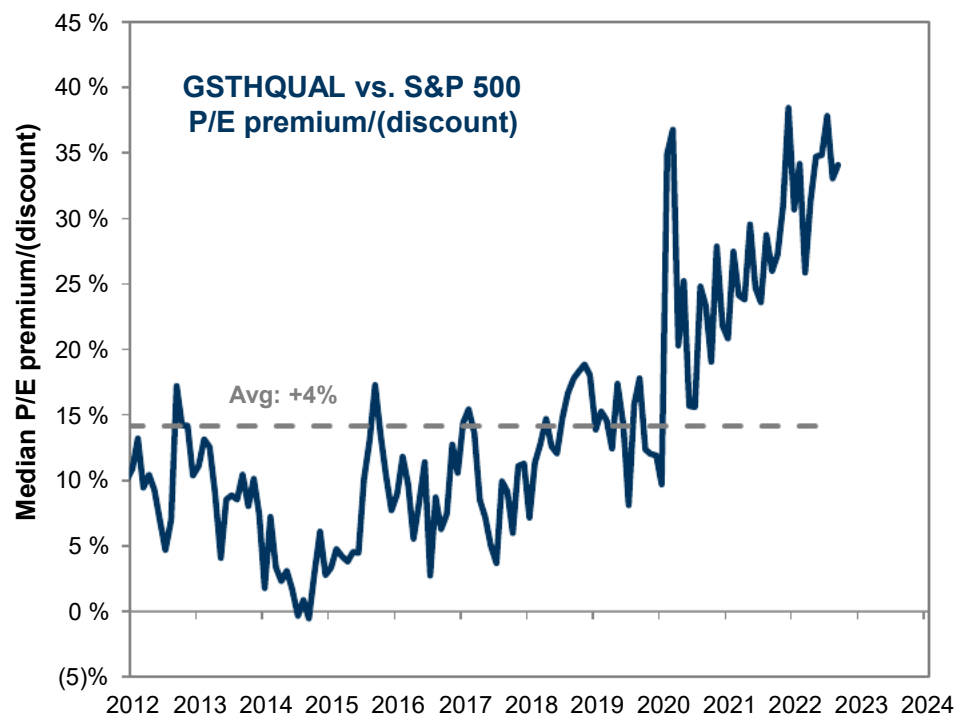
Performance and valuation of “Quality” stocks

GSTHQUAL has outperformed S&P 500 by 1 pp YTD (-22% vs. -23%)

Performance of “Quality” (GSTHQUAL) vs. S&P 500



Relative P/E multiple vs. S&P 500



| | Performance | Median Value and Growth Metrics | | | | | Quality metrics | | |
|--------------------|----------------|---------------------------------|--------------|------------|--------------|-------------|-----------------|-------------|---------------|
| | YTD | SPX Beta | 2023E Growth | | P/E NTM | Div Yield | Altman Z-score | ROE LTM | Quality Score |
| | | | EPS | Sales | | | | | |
| GSTHQUAL | (21.5)% | 1.0 | 9 % | 6 % | 21.8x | 1.2% | 5.5 | 25 % | 86 |
| S&P 500 | (22.7) | 0.9 | 9 | 5 | 15.9 | 1.9 | 3.5 | 19 | 51 |

Sector-neutral 50-stock “Quality” basket (GSTHQUAL)

Balance sheets, stable sales growth, high ROE, low EBIT deviation, low drawdown

| 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 | \$ 1,743 | 13.0 | 24x | 16 % | 0.0% | 32 % | 95 |
| Charter Communications | CHTR | 96 | 1.0 | 18 | 23 | 0.0 | 28 | 84 |
| Comcast Corp. | CMCSA | 213 | 1.7 | 13 | 11 | 2.3 | 15 | 79 |
| T-Mobile US Inc. | TMUS | 155 | 1.2 | 45 | 117 | 0.0 | 9 | 78 |
| Interpublic Grp of Cos. | IPG | 14 | 1.6 | 14 | 5 | 3.2 | 33 | 77 |
| Sector Median | | | | | | | | 52 |
| Consumer Discretionary (12% of the Basket) | | | | | | | | |
| Pool Corp. | POOL | \$ 17 | 10.5 | 24x | 7 % | 0.7% | 72 % | 98 |
| O'Reilly Automotive | ORLY | 47 | 4.1 | 21 | 11 | 0.0 | NM | 98 |
| Home Depot Inc. | HD | 324 | 7.1 | 19 | 7 | 2.4 | NM | 96 |
| Dollar General | DG | 51 | 3.5 | 19 | 9 | 1.0 | 39 | 91 |
| Tractor Supply | TSCO | 26 | 6.1 | 25 | 9 | 1.6 | 54 | 91 |
| Dollar Tree Inc. | DLTR | 35 | 3.5 | 20 | 13 | 0.0 | 22 | 79 |
| Sector Median | | | | | | | | 53 |
| Consumer Staples (6% of the Basket) | | | | | | | | |
| Church & Dwight | CHD | \$ 24 | 5.4 | 31x | 8 % | 1.1% | 22 % | 93 |
| McCormick & Co. | MKC | 24 | 2.7 | 31 | 8 | 1.5 | 19 | 91 |
| Monster Beverage | MNST | 42 | 24.9 | 28 | 14 | 0.0 | 23 | 89 |
| Sector Median | | | | | | | | 52 |
| Energy (4% of the Basket) | | | | | | | | |
| Coterra Energy Inc. | CTRA | \$ 24 | 5.3 | 10x | (20)% | 2.1% | 27 % | 59 |
| EOG Resources Inc. | EOG | 73 | 4.5 | 10 | (9) | 2.4 | 22 | 59 |
| 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 | \$ 46 | 20.8 | 57x | 15 % | 0.0% | NM | 94 |
| Thermo Fisher Scientific | TMO | 226 | 5.3 | 25 | 8 | 0.2 | 23 | 91 |
| ResMed Inc. | RMD | 35 | 14.5 | 38 | 14 | 0.7 | 18 | 90 |
| UnitedHealth Group | UNH | 483 | 4.2 | 24 | 14 | 1.1 | 25 | 86 |
| West Pharmaceutical Svc. | WST | 30 | 22.4 | 44 | 10 | 0.2 | 32 | 80 |
| STERIS Plc | STE | 24 | 4.1 | 28 | 16 | 0.7 | 8 | 79 |
| Charles River Laboratories Intl | CRL | 14 | 3.0 | 24 | 15 | 0.0 | 19 | 79 |
| Sector Median | | | | | | | | 49 |
| Industrials (8% of the Basket) | | | | | | | | |
| Fastenal Co. | FAST | \$ 33 | 19.6 | 32x | 8 % | 2.2% | 32 % | 90 |
| Cintas Corp. | CTAS | 43 | 8.6 | 35 | 11 | 0.9 | 34 | 88 |
| Verisk Analytics | VRSK | 34 | 5.6 | 35 | 11 | 0.6 | 27 | 88 |
| Copart Inc. | CPRT | 30 | 19.8 | 28 | 9 | 0.0 | 30 | 87 |
| Sector Median | | | | | | | | 54 |
| Materials (2% of the Basket) | | | | | | | | |
| Sherwin-Williams | SHW | \$ 64 | 3.6 | 26x | 19 % | 1.0% | 72 % | 96 |
| Sector Median | | | | | | | | 54 |
| Real Estate (2% of the Basket) | | | | | | | | |
| American Tower | AMT | \$ 110 | NM | 51x | 17 % | 2.2% | 57 % | 85 |
| Sector Median | | | | | | | | 42 |
| High Quality Stock <GSTHQUAL> Median | | | 5.5 | 26x | 11 % | 0.9% | 25 % | 86 |
| S&P 500 Median | | | 3.5 | 19 | 11 | 1.5 | 19 | 51 |

Quality score: weighted avg. of each stock's percentile rank vs. peers on 5 criteria: EBIT downside deviation (40%); sales Sortino ratio (40%); 5th percentile drawdown (10%); and average ROE (10%)

50-stock “Quality” basket (continued)

Balance sheets, stable sales growth, high ROE, low EBIT deviation, low drawdown

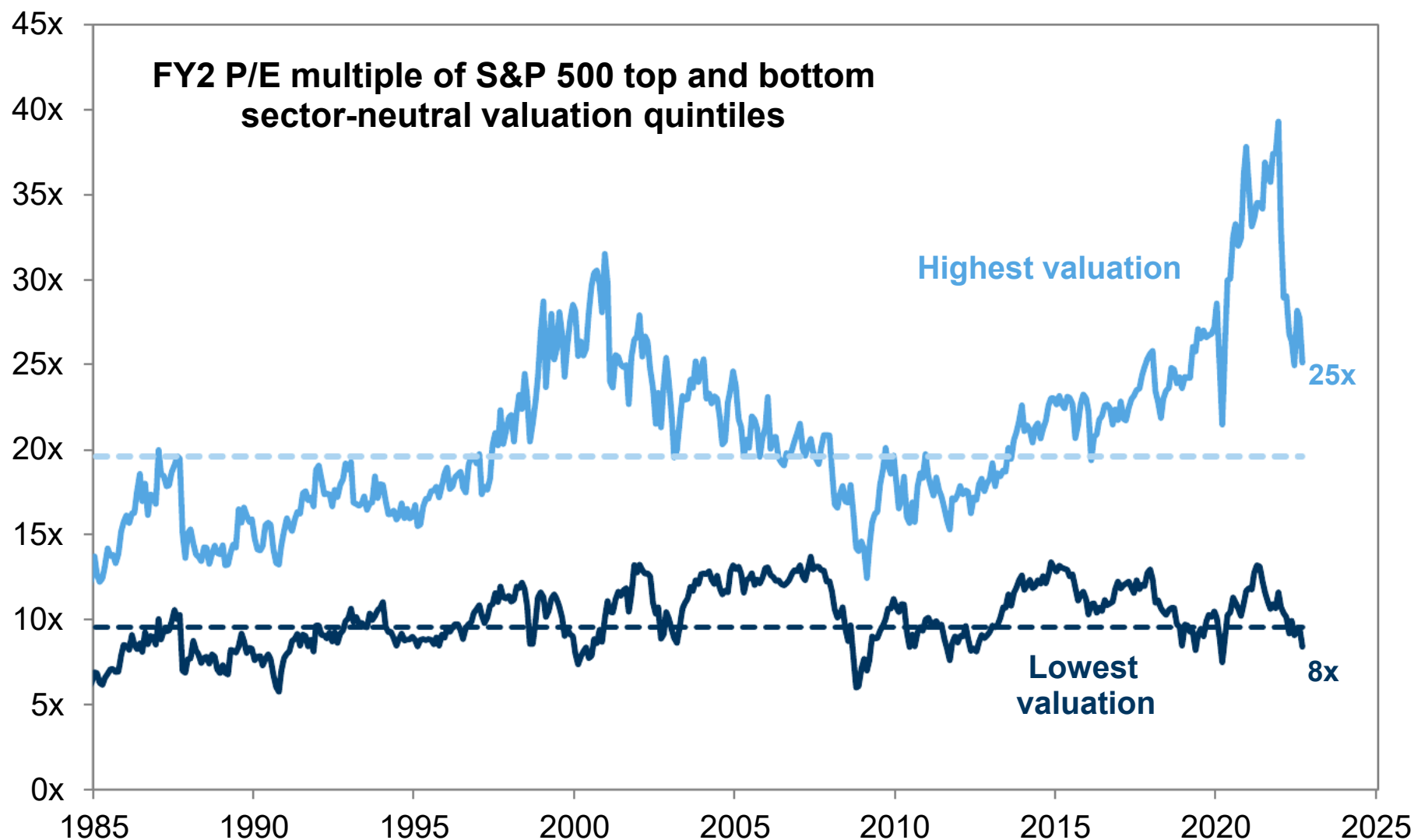
| Company | Ticker | Market Cap (\$ bil) | Altman Z-Score | P/E (NTM) | 2023E EPS Growth | Div Yield | ROE LTM | Quality Score |
|---------------------------------------|--------|---------------------|----------------|-----------|------------------|-----------|---------|---------------|
| Financials (12% of the Basket) | | | | | | | | |
| First Republic Bank | FRC | \$ 30 | NM | 20x | 15 % | 0.5% | 13 % | 88 |
| Intercontinental Exchange | ICE | 76 | NM | 24 | 9 | 1.1 | 7 | 86 |
| MSCI Inc. | MSCI | 40 | NM | 43 | 16 | 0.8 | NM | 82 |
| Moody's Corp. | MCO | 61 | NM | 27 | 13 | 0.8 | 93 | 82 |
| Truist Financial | TFC | 80 | NM | 13 | 15 | 3.2 | 12 | 77 |
| Raymond James Financial | RJF | 23 | NM | 14 | 17 | 1.2 | 20 | 74 |
| Sector Median | | | | | | | | 49 |
| Utilities (2% of the Basket) | | | | | | | | |
| Evergy Inc. | EVRG | \$ 15 | NM | 19x | 7 % | 3.4% | 10 % | 84 |
| Sector Median | | | | | | | | 50 |

| Company | Ticker | Market Cap (\$ bil) | Altman Z-Score | P/E (NTM) | 2023E EPS Growth | Div Yield | ROE LTM | Quality Score |
|---|--------|---------------------|----------------|------------|------------------|-------------|-------------|---------------|
| Information Technology (28% of the Basket) | | | | | | | | |
| Accenture Plc | ACN | \$ 207 | 7.8 | 29x | 11 % | 1.2% | 32 % | 92 |
| CDW Corp. | CDW | 24 | 4.0 | 19 | 10 | 1.1 | NM | 91 |
| Cadence Design Systems | CDNS | 44 | 19.3 | 43 | 14 | 0.0 | 29 | 91 |
| EPAM Systems Inc. | EPAM | 15 | 13.7 | 27 | 38 | 0.0 | 22 | 89 |
| Jack Henry & Associates | JKHY | 14 | 11.9 | 39 | 9 | 1.0 | 26 | 88 |
| Synopsys Inc. | SNPS | 49 | 10.3 | 42 | 17 | 0.0 | 19 | 88 |
| Amphenol Corp. | APH | 45 | 5.1 | 27 | 10 | 1.1 | 28 | 85 |
| Paychex Inc. | PAYX | 46 | 5.8 | 35 | 7 | 2.1 | 42 | 84 |
| Tyler Technologies | TYL | 18 | 5.9 | 57 | 10 | 0.0 | 9 | 82 |
| Broadridge Financial Solutions | BR | 18 | 3.4 | 23 | 8 | 1.7 | 32 | 82 |
| ANSYS Inc. | ANSS | 27 | 11.2 | 39 | 12 | 0.0 | 11 | 79 |
| Cognizant Tech Solutions | CTSH | 48 | 7.9 | 20 | 11 | 1.2 | 19 | 74 |
| Broadcom Inc. | AVGO | 260 | 4.0 | 17 | 9 | 2.6 | 34 | 74 |
| Akamai Technologies | AKAM | 19 | 4.4 | 20 | 11 | 0.0 | 15 | 74 |
| Sector Median | | | | | | | | 54 |
| High Quality Stock <GSTHQUAL> Median | | | 5.5 | 26x | 11 % | 0.9% | 25 % | 86 |
| S&P 500 Median | | | 3.5 | 19 | 11 | 1.5 | 19 | 51 |

Quality score: weighted avg. of each stock's percentile rank vs. peers on 5 criteria: EBIT downside deviation (40%); sales Sortino ratio (40%); 5th percentile drawdown (10%); and average ROE (10%)

Valuation of cheap and expensive stocks over time

Spread between the most expensive and cheapest stocks remains wide



Value stocks that Value-oriented funds are underweight

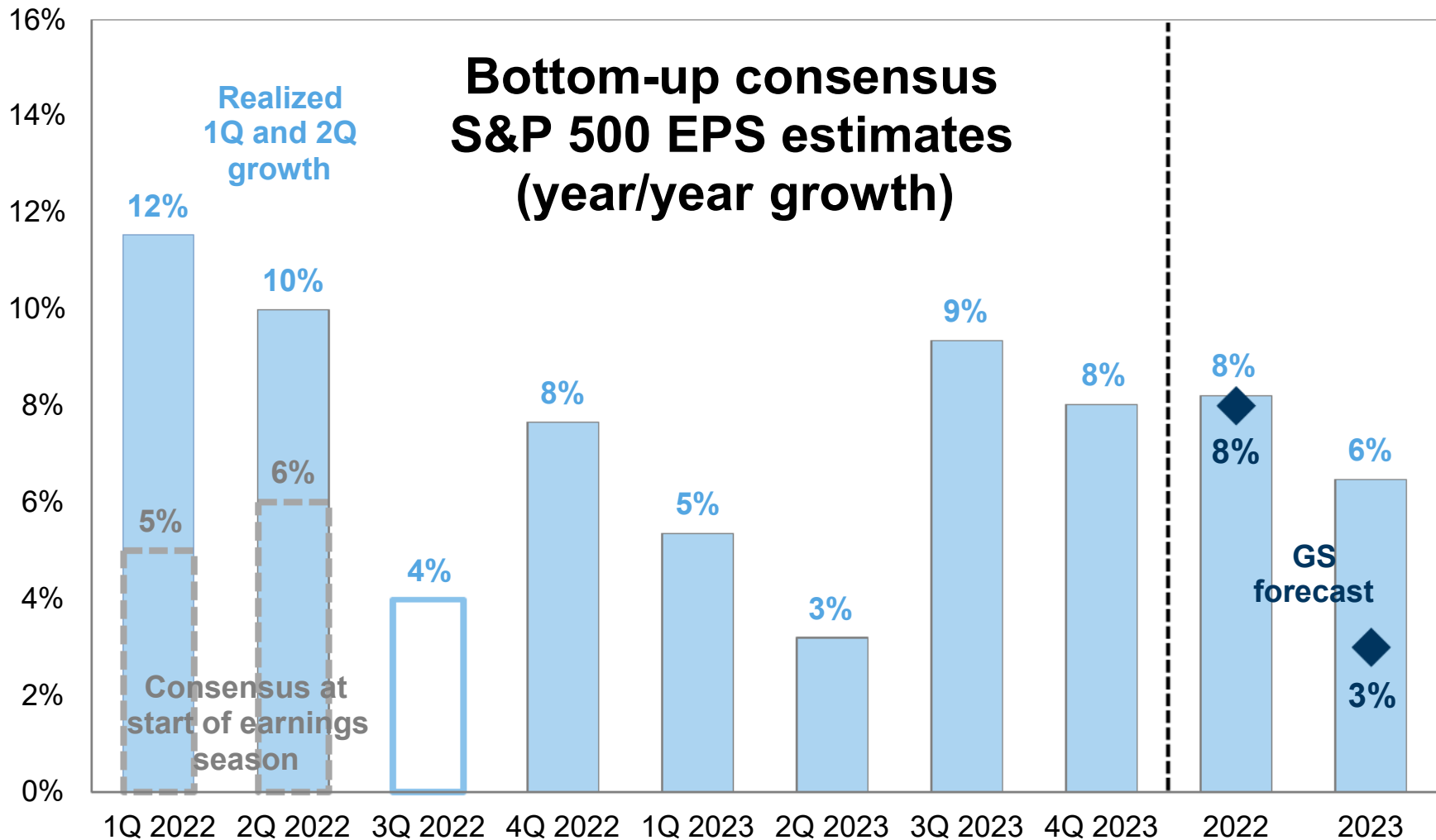
Stocks in our S&P 500 Value factor that Value mutual funds are most underweight

| Ticker | Company name | Sector | Market cap (\$ bn) | YTD return | NTM | | | Russell 1000 Value index weight (%) | Average Value fund OW/(UW) (bp) |
|---------------------------|--------------------------|------------------------|--------------------|--------------|------------|--------------|--------------|-------------------------------------|---------------------------------|
| | | | | | P/E | EV/Sales | PEG | | |
| PFE | Pfizer | Health Care | \$264 | (24)% | 8 x | 2.9 x | NM | 1.7 % | (81)bp |
| T | AT&T | Communication Services | 120 | (12) | 7 | 2.6 | NM | 0.8 | (45) |
| MRNA | Moderna | Health Care | 55 | (53) | 8 | 2.4 | NM | 0.3 | (26) |
| F | Ford Motor | Consumer Discretionary | 61 | (41) | 6 | 0.9 | 0.4 | 0.2 | (20) |
| MO | Altria Group | Consumer Staples | 81 | (7) | 9 | 4.8 | 1.8 | 0.4 | (20) |
| ED | Consolidated Edison | Utilities | 36 | 12 | 21 | NM | 4.4 | 0.2 | (17) |
| CVS | CVS Health | Health Care | 134 | (4) | 12 | 0.6 | 1.7 | 0.7 | (10) |
| VTR | Ventas | Real Estate | 19 | (17) | 15 | NM | 1.5 | 0.1 | (9) |
| MU | Micron Technology | Information Technology | 61 | (47) | 12 | 2.2 | 1.8 | 0.3 | (9) |
| NUE | Nucor | Materials | 36 | (9) | 6 | 0.9 | NM | 0.2 | (8) |
| FE | FirstEnergy Corp | Utilities | 23 | (4) | 17 | NM | NM | 0.1 | (7) |
| CSCO | Cisco Systems | Information Technology | 188 | (35) | 12 | 3.0 | 1.7 | 1.0 | (7) |
| TFC | Truist Financial | Financials | 64 | (24) | 8 | NM | 2.5 | 0.4 | (7) |
| PSX | Phillips 66 | Energy | 41 | 6 | 6 | 0.3 | 11.7 | 0.2 | (6) |
| HCA | HCA Healthcare | Health Care | 62 | (27) | 11 | 1.5 | 1.6 | 0.2 | (6) |
| BXP | Boston Properties | Real Estate | 13 | (34) | 10 | NM | NM | 0.1 | (6) |
| DOW | Dow | Materials | 35 | (21) | 9 | 0.8 | NM | 0.2 | (6) |
| MOS | Mosaic | Materials | 19 | 19 | 4 | 1.1 | 2.5 | 0.1 | (6) |
| PCAR | PACCAR | Industrials | 30 | (5) | 11 | 1.3 | 0.8 | 0.2 | (6) |
| MPC | Marathon Petroleum | Energy | 49 | 43 | 6 | 0.5 | 0.2 | 0.3 | (5) |
| REG | Regency Centers | Real Estate | 11 | (27) | 14 | NM | 3.9 | 0.1 | (5) |
| SWKS | Skyworks Solutions | Information Technology | 16 | (39) | 8 | 3.1 | 0.9 | 0.1 | (5) |
| KIM | Kimco Realty | Real Estate | 13 | (25) | 12 | NM | 1.8 | 0.1 | (5) |
| UAL | United Airlines Holdings | Industrials | 13 | (27) | 7 | 0.7 | NM | 0.1 | (5) |
| VLO | Valero Energy | Energy | 44 | 34 | 5 | 0.3 | 0.2 | 0.2 | (5) |
| Median | | | \$41 | (21)% | 9 x | 1.2 x | 1.7 x | 0.2 % | (7)bp |
| S&P 500 median | | | 27 | (20) | 16 | 2.7 | 1.7 | | |

Earnings: baseline and recession scenarios

Quarterly path of S&P 500 EPS growth

GS forecasts EPS growth of 3% in 2023 vs. consensus forecast of 6%



3Q 2022 consensus sales, earnings, and margins

S&P 500 expected to grow EPS by +4% year/year, but by -3% excluding Energy

3Q 2022 consensus bottom-up

| Sector | EPS growth | Sales growth | Margin change |
|---------------------------------------|------------|--------------|---------------|
| Energy | 118 % | 48 % | 429 bp |
| Real Estate | 27 | NM | NM |
| Industrials | 24 | 14 | 81 |
| Consumer Discretionary | 8 | 13 | (37) |
| Consumer Staples | (1) | 9 | (70) |
| Utilities | (2) | NM | NM |
| Materials | (3) | 7 | (121) |
| Info Tech | (4) | 6 | (224) |
| Health Care | (5) | 6 | (124) |
| Financials | (11) | NM | NM |
| Comm Services | (17) | 9 | (423) |
| S&P 500 | 4 % | | |
| <i>ex. Financials & Utilities</i> | 6 | 13 % | (71)bp |
| <i>ex. Energy</i> | (3) | | |
| <i>ex. Energy, Fins, and Utils</i> | (2) | 9 | (129) |

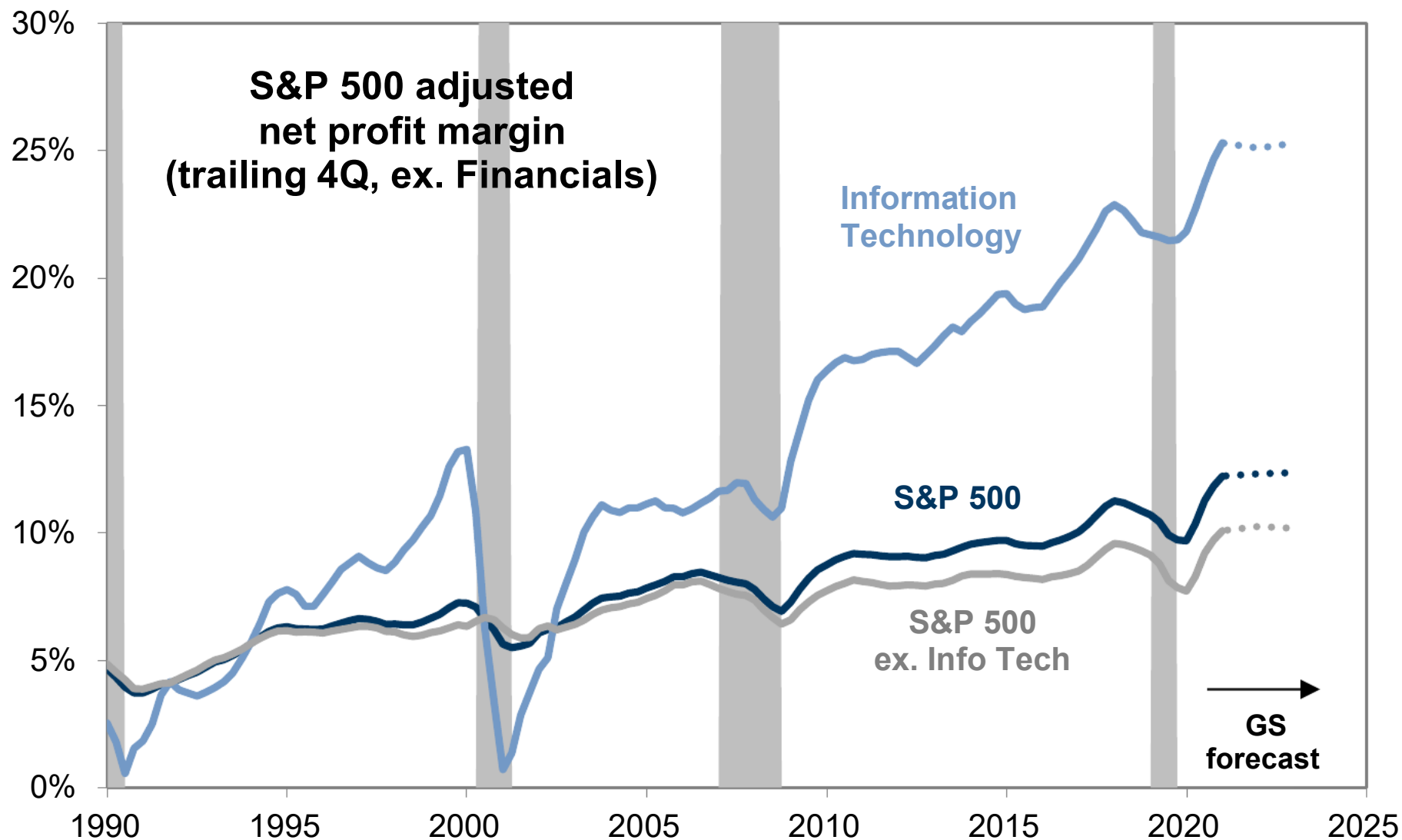
2023 scenarios: S&P 500 sales, margins, and EPS

Consensus growth (+6%) vs. our top-down Baseline (+3%) & Recession (-11%)

| | 2021A | GS top-down 2022E | 2023E | | |
|--|--------------|-------------------------|---------------|-----------------------|------------------------|
| | | | Goldman Sachs | | Consensus bottom-up |
| | | | Baseline | Recession Scenario | |
| S&P 500 ex. Financials, Utilities, Real Estate | | | | | |
| <i>Sales growth (year/year)</i> | 16 % | 12 % | 4 % | (2)% | 5 % |
| Profit Margin | 12.2% | 12.3% | 12.0% | 11.0% | 12.3% |
| <i>Year/Year growth</i> | 251 bp | 9 bp | (25)bp | (126)bp | 9 bp |
| S&P 500 adjusted EPS | \$209 | \$226 | \$234 | \$200 | \$241 |
| Year/Year growth | 47 % | 8 % | 3 % | (11)% | 6 % |

S&P 500 net margins will reach record high in 2022

Tech sector margins of 25% are roughly 2x the 12% margins for broader market



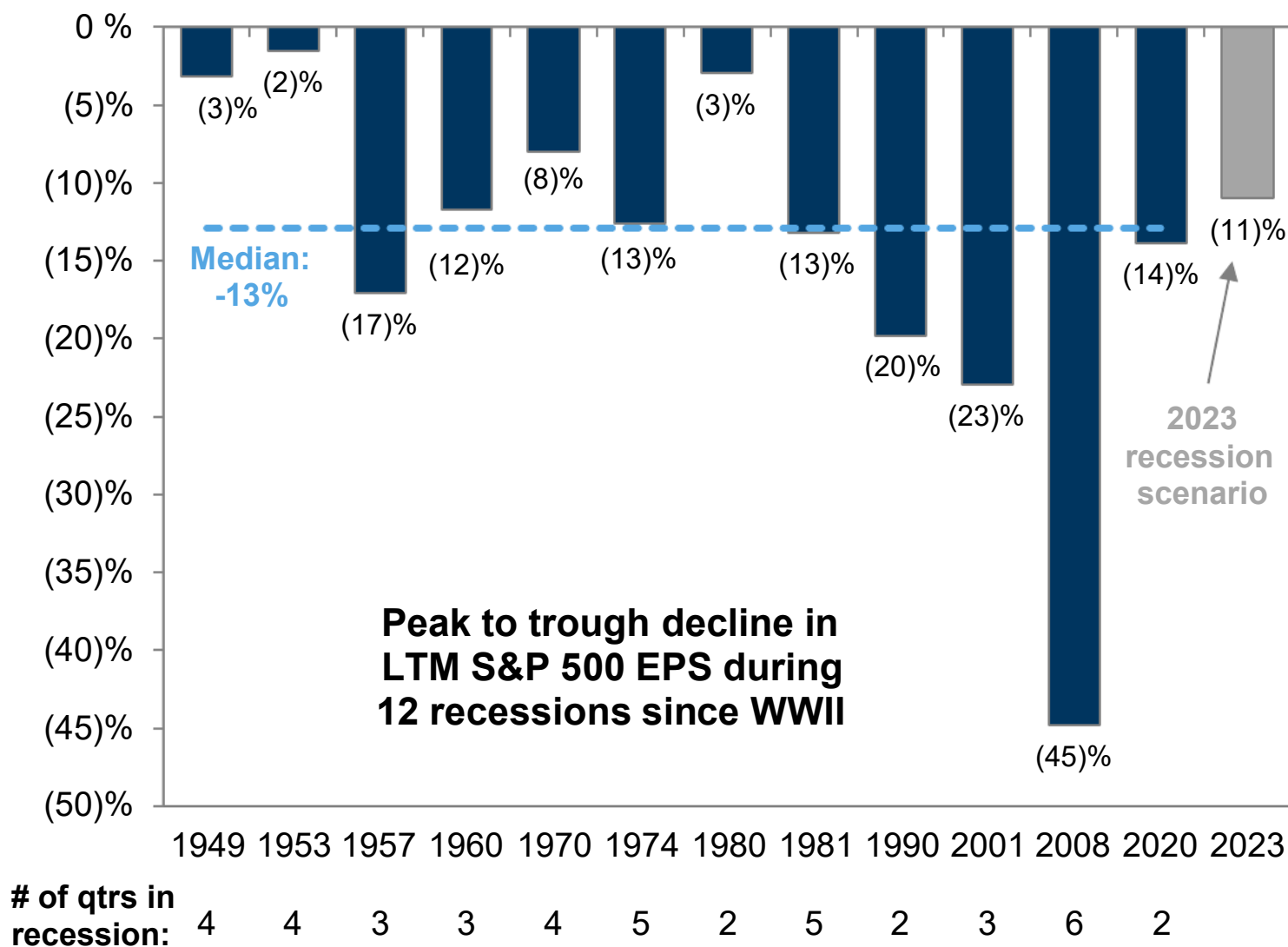
Margin forecasts by sector: GS vs. Consensus

We forecast 25 bp of compression vs. consensus forecast of 14 bp expansion

| Sector | GS Top-Down | | | | | Cons. Bottom-Up | |
|----------------------------|---------------|---------------|---------------|-------------|---------------|-----------------|--------------|
| | Margin | | | Change | | Change | |
| | 2021A | 2022E | 2023E | 2022E | 2023E | 2022E | 2023E |
| Information Technology | 25.5 % | 24.4 % | 24.3 % | (104)bp | (8)bp | (115)bp | 63 bp |
| Communication Services | 18.0 | 15.0 | 14.8 | (300) | (25) | (292) | 16 |
| Materials | 13.3 | 13.6 | 12.8 | 30 | (80) | 26 | (79) |
| Energy | 7.7 | 13.6 | 13.1 | 583 | (43) | 553 | (119) |
| Health Care | 11.3 | 11.1 | 10.6 | (28) | (43) | (38) | (43) |
| Industrials | 8.2 | 9.2 | 9.1 | 100 | (15) | 140 | 87 |
| Consumer Staples | 7.5 | 7.1 | 7.0 | (40) | (9) | (37) | 13 |
| Consumer Discretionary | 7.2 | 6.6 | 6.5 | (64) | (9) | (48) | 107 |
| S&P 500 Margin | 12.2 % | 12.3 % | 12.0 % | 9 bp | (25)bp | 4 bp | 14 bp |
| Consensus bottom-up | 12.2 % | 12.2 % | 12.4 % | | | | |

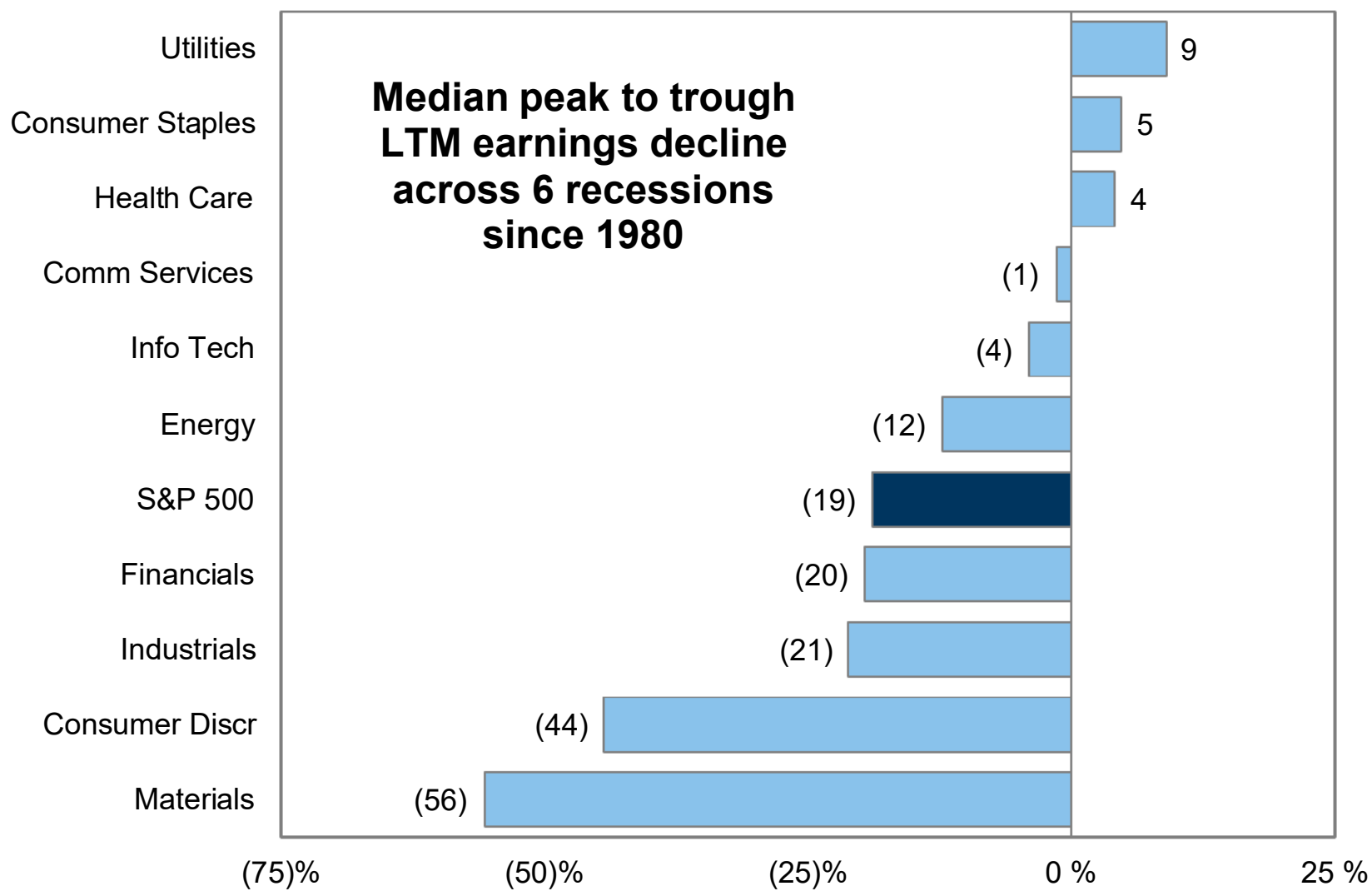
Median EPS decline of 13% during prior recessions

Recent declines were dominated by Autos (1990), Tech (2001), and Financials (2008)



Earnings decline across sectors during recessions

Materials and Discretionary hit hardest; Utilities and Staples more protected



2023 EPS: Baseline, recession, and consensus

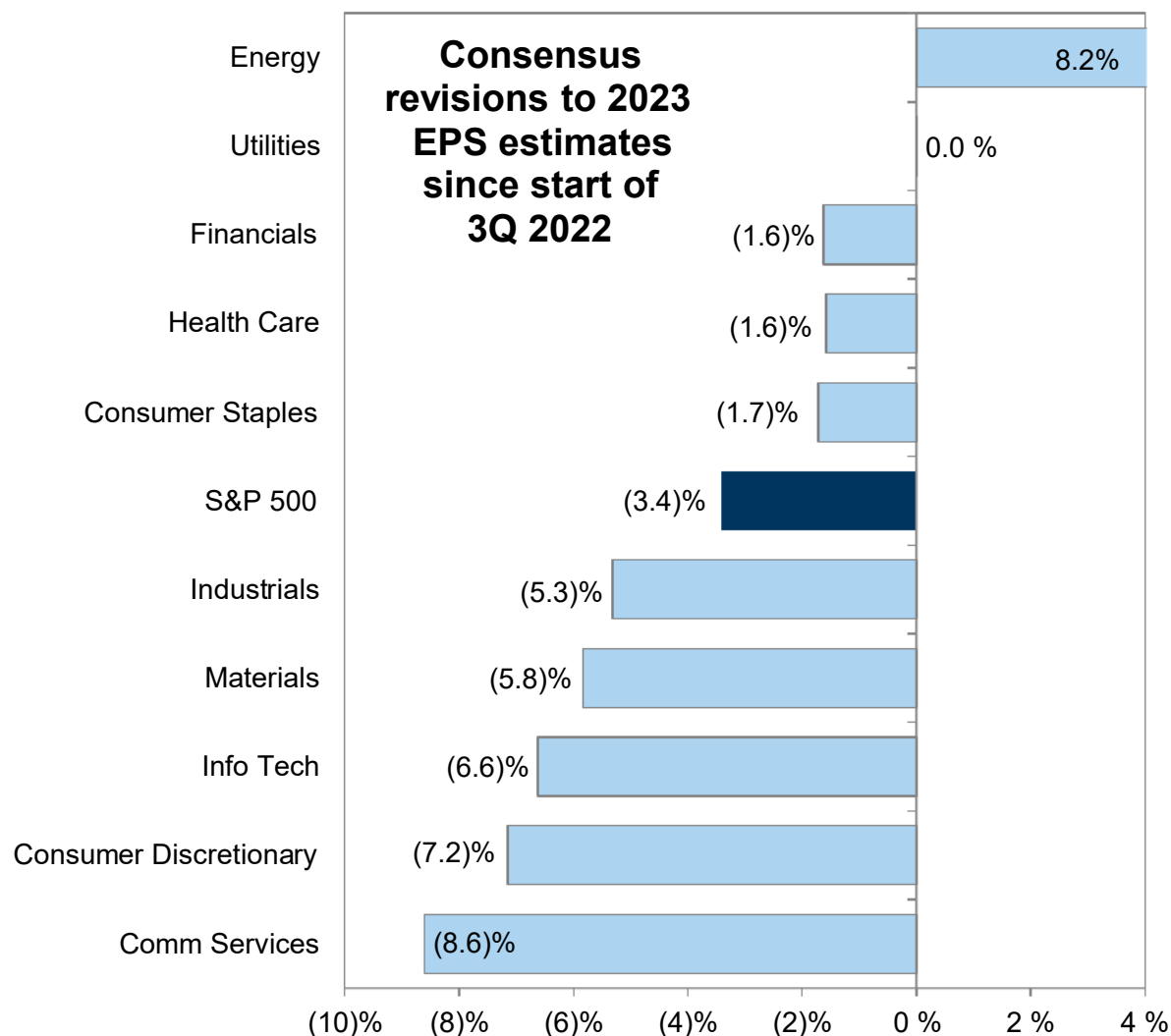
Sector EPS breakdown of GS baseline vs. recession vs. consensus scenarios

GS top-down S&P 500 2023E EPS

| | Baseline | | Recession scenario | | Consensus bottom-up 2023E EPS | | Potential revision from consensus to GS recession |
|------------------------|--------------|------------|--------------------|--------------|----------------------------------|------------|--|
| | Contribution | Growth | Contribution | Growth | Contribution | Growth | |
| Utilities | \$6 | 3 % | \$6 | 3 % | \$6 | 3 % | 0 pp |
| Health Care | 36 | (1) | 36 | (1) | 36 | (1) | (1) |
| Energy | 24 | (7) | 15 | (15) | 20 | (15) | (0) |
| Consumer Staples | 12 | 3 | 12 | (1) | 13 | 7 | (7) |
| Information Technology | 51 | 6 | 49 | (3) | 54 | 10 | (14) |
| Materials | 7 | (7) | 6 | (24) | 7 | (8) | (16) |
| Communication Services | 21 | 4 | 20 | (9) | 23 | 11 | (21) |
| Real Estate | 6 | 8 | 4 | (20) | 6 | 9 | (29) |
| Financials | 37 | 13 | 29 | (15) | 38 | 13 | (28) |
| Industrials | 16 | 3 | 12 | (25) | 19 | 15 | (40) |
| Consumer Discretionary | 16 | 6 | 10 | (38) | 20 | 28 | (66) |
| S&P 500 | \$234 | 3 % | \$200 | (11)% | \$244 | 7 % | (18)pp |

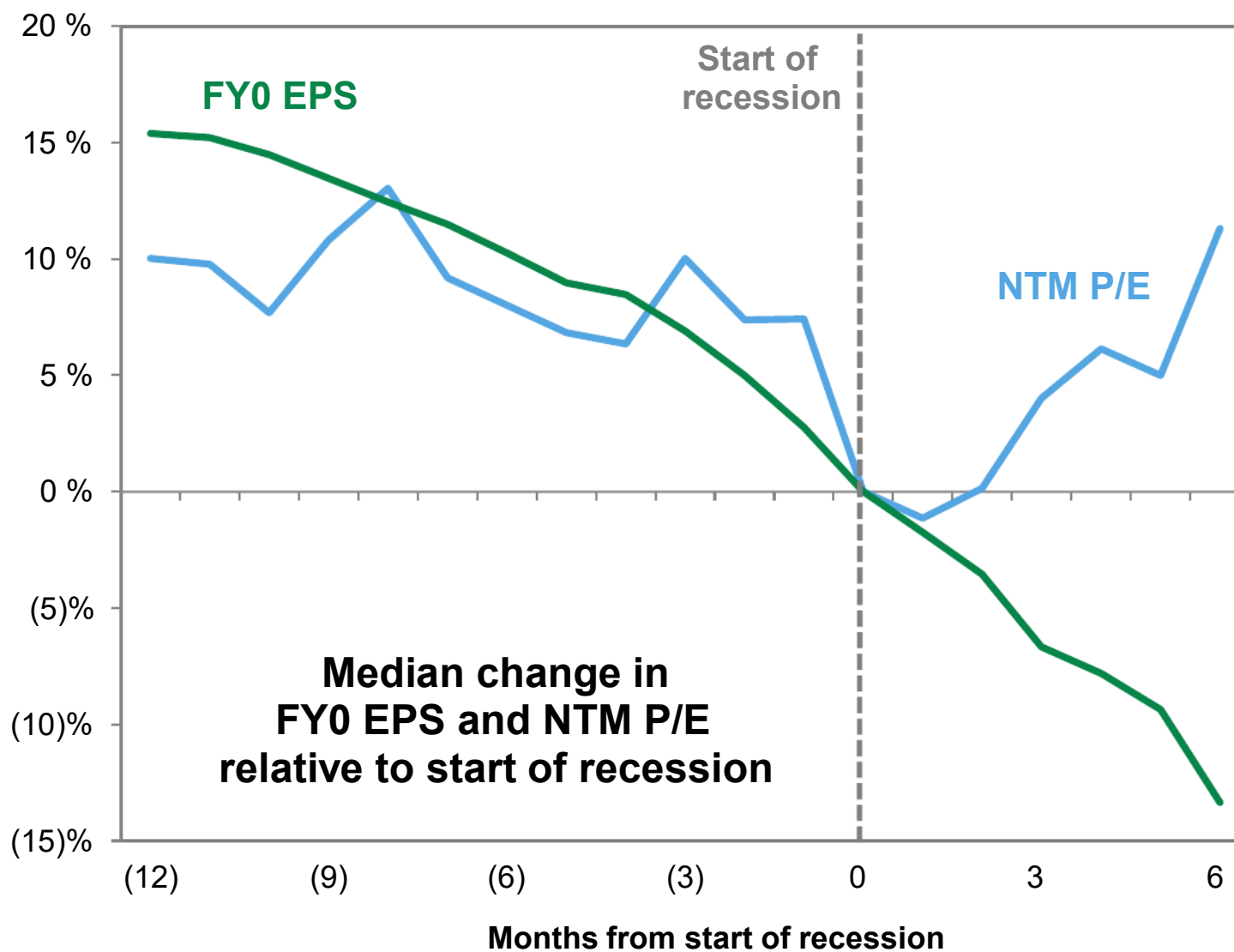
2023 S&P 500 EPS revisions since start of 3Q

Communication Services has experienced largest negative EPS revisions



Path of earnings and valuations around recessions

Earnings typically continue to fall but P/E stabilizes after a recession starts



S&P 500 price based on P/E and expected EPS

13% median peak-to-trough EPS decline during 12 recessions since 1948

2023 EPS scenario

| | Cons. Estimate | GS baseline | GS recession |
|----------------|----------------|--------------|--------------|
| | \$241 | \$234 | \$200 |
| vs. cons. 2022 | (+7%) | (+3%) | (-12%) |

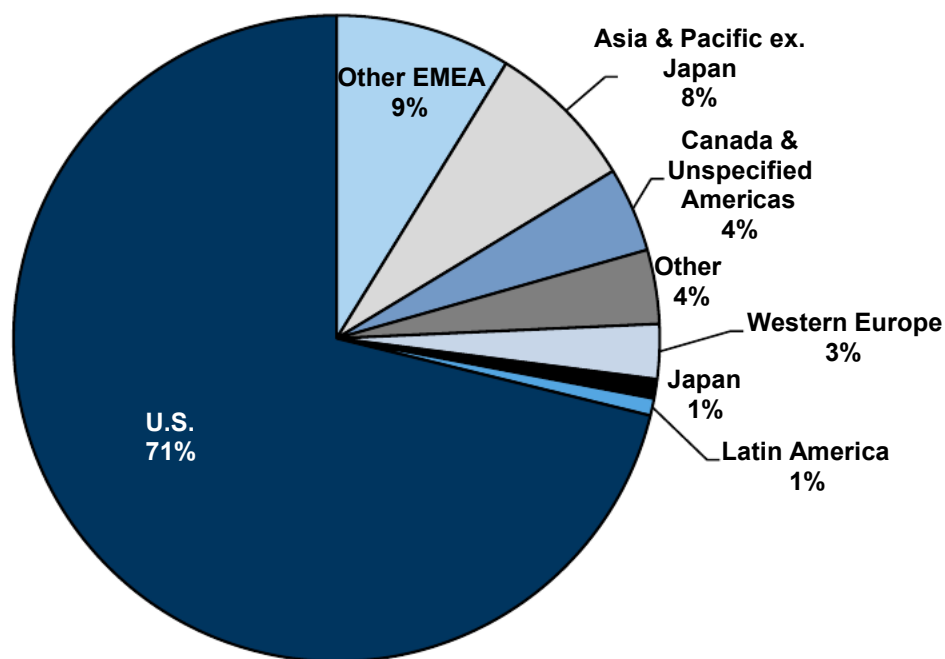
Est. at YE 2022 assuming halfway revision

\$241 **\$238** **\$221**

| | | | | |
|-------------|--------------|--------------|----------------|-------------------------|
| Forward P/E | 18x | 4350 | 4300 | 3950 |
| | 17x | 4100 | 4050 | 3750 |
| | 16x | 3850 | 3800 | 3550 |
| | Current 15x | Current 3600 | YE Target 3550 | 3300 |
| | 14x | 3400 | 3350 | Recession Scenario 3100 |
| | Mar. '20 13x | 3150 | 3100 | 2850 |
| | 12x | 2900 | 2850 | 2650 |

Foreign revenues by region for S&P 500 firms

71% of aggregate sales to US, 12% to EMEA, and 9% to Asia-Pacific



| Region | Revenues | | |
|-----------------------------------|-----------------------|--------------|--------------|
| | 2021 (\$ Billions) | % of | |
| | | 2021 | 2020 |
| Americas | \$10,700 | 76 % | 76 % |
| North America | 10,226 | 73 | 74 |
| United States | 9,983 | 71 | 72 |
| Latin America | 120 | 1 | 1 |
| EMEA | \$1,617 | 12 % | 11 % |
| Europe | 846 | 6 | 6 |
| Western Europe ex. UK | 227 | 2 | 1 |
| United Kingdom | 157 | 1 | 1 |
| Eastern Europe | 12 | 0 | 0 |
| Africa & Middle East | 32 | 0 | 0 |
| Asia Pacific | \$1,193 | 9 % | 8 % |
| Japan | 135 | 1 | 1 |
| Greater China | 370 | 3 | 2 |
| Other / Unclassified | \$520 | 4 % | 4 % |
| Total S&P 500 | \$14,031 | 100 % | 100 % |
| Non-US Sales as % of Total | \$4,047 | 29 % | 28 % |

S&P 500 foreign revenues by sector

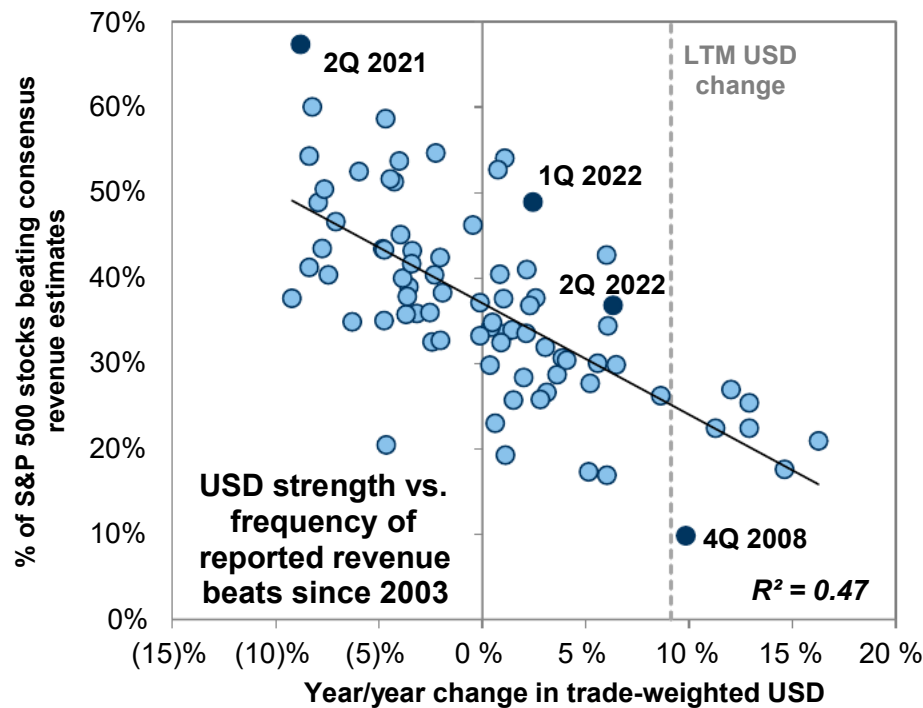
Information Technology (59%) and Materials (50%) have highest non-US sales

| Sector | Revenues (\$bn) | | Sales Exposure | |
|------------------------|-----------------|----------------|----------------|-------------|
| | Total | Foreign | Foreign | Explicit EM |
| Information Technology | \$1,548 | \$919 | 59 % | 17 % |
| Materials | 451 | 225 | 50 | 11 |
| Energy | 1,032 | 379 | 37 | 3 |
| Industrials | 1,361 | 461 | 34 | 6 |
| Communication Services | 1,182 | 326 | 28 | 1 |
| Consumer Staples | 1,713 | 464 | 27 | 3 |
| Consumer Discretionary | 1,865 | 453 | 24 | 3 |
| Real Estate | 122 | 28 | 23 | 3 |
| Financials | 1,694 | 328 | 19 | 1 |
| Health Care | 2,696 | 455 | 17 | 2 |
| Utilities | 364 | 9 | 3 | 2 |
| S&P 500 | \$14,031 | \$4,047 | 29 % | 4 % |

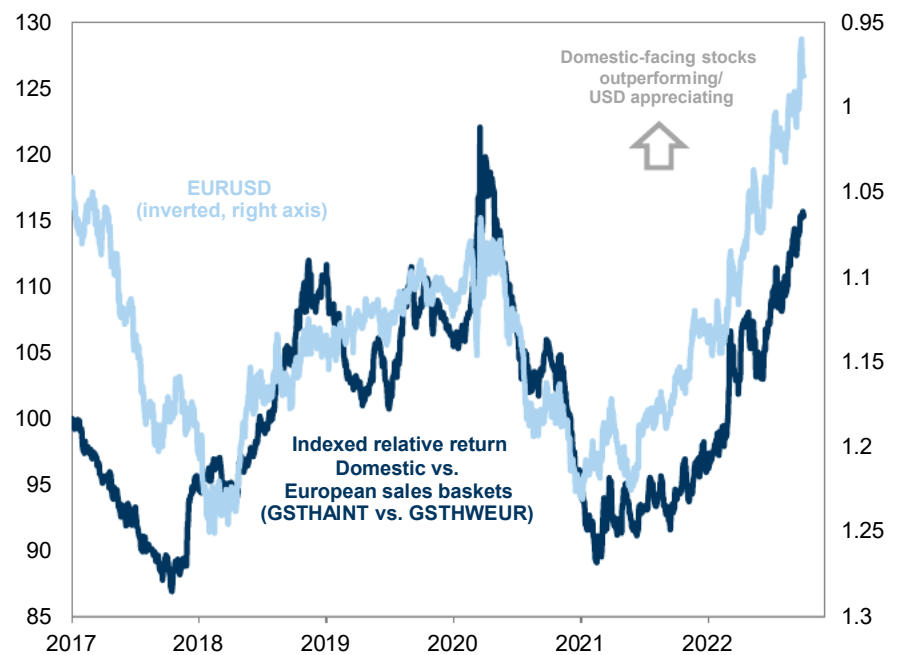
EPS impact from US Dollar changes

US-facing stocks outperform as the USD strengthens

Dollar strength and revenue surprises

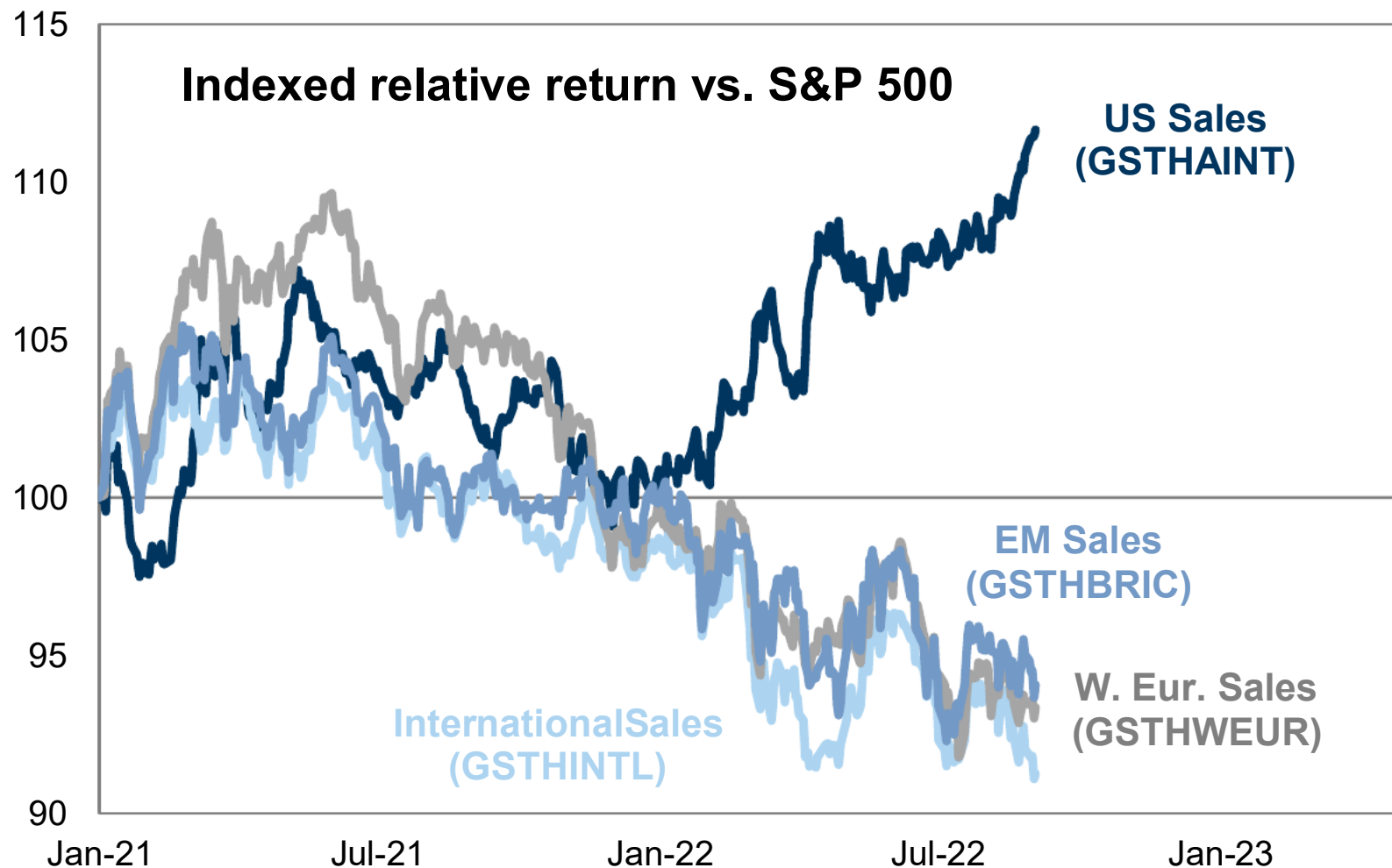


Domestic-facing stocks outperform alongside USD strength



Performance of geographic sales baskets

High US sales (GSTHAINT) beating International (GSTHINTL) by 18 pp YTD



Domestic Sales basket (GSTHAINT)

Constituents of our Domestic Sales basket (median stock has 100% US sales)

| Company | Ticker | Market Cap (\$bn) | Non-U.S. Sales |
|-------------------------------|--------|-------------------|----------------|
| COMMUNICATION SERVICES | | | |
| Charter Communications | CHTR | \$68 | 0 % |
| Fox Corp. | FOXA | 15 | 0 |
| T-Mobile US Inc. | TMUS | 178 | 0 |
| Verizon Communications | VZ | 173 | 0 |
| DISH Network Corp. | DISH | 5 | 0 |
| Sector median | | | 37 % |
| CONSUMER DISCRETIONARY | | | |
| Dollar General | DG | \$56 | 0 % |
| Chipotle Mexican Grill | CMG | 45 | 0 |
| Ross Stores Inc. | ROST | 31 | 0 |
| Target Corp. | TGT | 76 | 0 |
| D.R. Horton Inc. | DHI | 25 | 0 |
| Sector median | | | 21 % |
| CONSUMER STAPLES | | | |
| Altria Group Inc. | MO | \$81 | 0 % |
| Kroger Co. | KR | 35 | 0 |
| Constellation Brands | STZ | 40 | 3 |
| Sector median | | | 27 % |
| ENERGY | | | |
| Devon Energy Corp. | DEV | \$46 | 0 % |
| Pioneer Natural Resources | PXD | 58 | 0 |
| Marathon Petroleum | MPC | 54 | 0 |
| Sector median | | | 16 % |

| Company | Ticker | Market Cap (\$bn) | Non-U.S. Sales |
|------------------------|--------|-------------------|----------------|
| FINANCIALS | | | |
| Truist Financial | TFC | \$62 | 0 % |
| CME Group Inc. | CME | 70 | 0 |
| Charles Schwab | SCHW | 128 | 0 |
| PNC Financial Svc. Grp | PNC | 65 | 0 |
| Capital One Financial | COF | 41 | 0 |
| Wells Fargo & Co. | WFC | 164 | 0 |
| Sector median | | | 7 % |
| HEALTH CARE | | | |
| Elevance Health | ELV | \$116 | 0 % |
| Centene Corp. | CNC | 53 | 0 |
| AmerisourceBergen | ABC | 31 | 0 |
| Quest Diagnostics | DGX | 15 | 0 |
| CVS Health Corp. | CVS | 130 | 0 |
| Humana Inc. | HUM | 61 | 0 |
| DaVita Inc. | DVA | 8 | 6 |
| Sector median | | | 39 % |
| INDUSTRIALS | | | |
| Southwest Airlines | LUV | \$22 | 0 % |
| Norfolk Southern | NSC | 57 | 0 |
| Republic Services | RSG | 45 | 0 |
| CSX Corp. | CSX | 68 | 0 |
| Sector median | | | 31 % |

| Company | Ticker | Market Cap (\$bn) | Non-U.S. Sales |
|--------------------------------|--------|-------------------|----------------|
| INFORMATION TECHNOLOGY | | | |
| Paycom Software | PAYC | \$20 | 0 % |
| Tyler Technologies | TYL | 15 | 0 |
| Jack Henry & Associates | JKHY | 14 | 0 |
| Paychex Inc. | PAYX | 44 | 1 |
| Intuit Inc. | INTU | 119 | 5 |
| CDW Corp. | CDW | 23 | 12 |
| Broadridge Financial Solutions | BR | 20 | 12 |
| Automatic Data Processing | ADP | 100 | 13 |
| Fiserv Inc. | FISV | 66 | 14 |
| Enphase Energy Inc. | ENPH | 38 | 20 |
| Global Payments | GPN | 35 | 21 |
| Roper Technologies | ROP | 42 | 22 |
| Fidelity National Info Svc. | FIS | 55 | 26 |
| Cognizant Tech Solutions | CTSH | 32 | 26 |
| Sector median | | | 54 % |
| MATERIALS | | | |
| Nucor Corp. | NUE | \$35 | 0 % |
| Sector median | | | 57 % |
| REAL ESTATE | | | |
| Public Storage | PSA | \$58 | 0 % |
| Sector median | | | 0 % |
| UTILITIES | | | |
| Southern Co. | SO | \$83 | 0 % |
| Sector median | | | 0 % |
| GSTHAINT median | | | 0 % |
| S&P 500 median | | | 29 |

International Sales basket (GSTHINTL)

Constituents of International Sales basket (median stock has 73% non-US sales)

| Company | Ticker | Market Cap (\$bn) | Non-U.S. Sales |
|-------------------------------|--------|-------------------|----------------|
| COMMUNICATION SERVICES | | | |
| News Corp. | NWSA | \$9 | 63 % |
| Netflix Inc. | NFLX | 100 | 59 |
| Meta Platforms Inc. | META | 368 | 59 |
| Electronic Arts | EA | 35 | 57 |
| Alphabet Inc. | GOOGL | 1328 | 54 |
| Sector median | | | 37 % |
| CONSUMER DISCRETIONARY | | | |
| Las Vegas Sands | LVS | \$28 | 100 % |
| Booking Holdings | BKNG | 75 | 87 |
| BorgWarner Inc. | BWA | 9 | 83 |
| PVH Corp. | PVH | 4 | 68 |
| Aptiv PLC | APTIV | 25 | 67 |
| Sector median | | | 21 % |
| CONSUMER STAPLES | | | |
| Philip Morris Intl | PM | \$147 | 100 % |
| Estee Lauder Companies | EL | 58 | 79 |
| Mondelez Intl | MDLZ | 84 | 75 |
| Sector median | | | 27 % |
| ENERGY | | | |
| Schlumberger | SLB | \$54 | 85 % |
| Baker Hughes | BKR | 25 | 78 |
| Exxon Mobil Corp. | XOM | 403 | 62 |
| Sector median | | | 16 % |

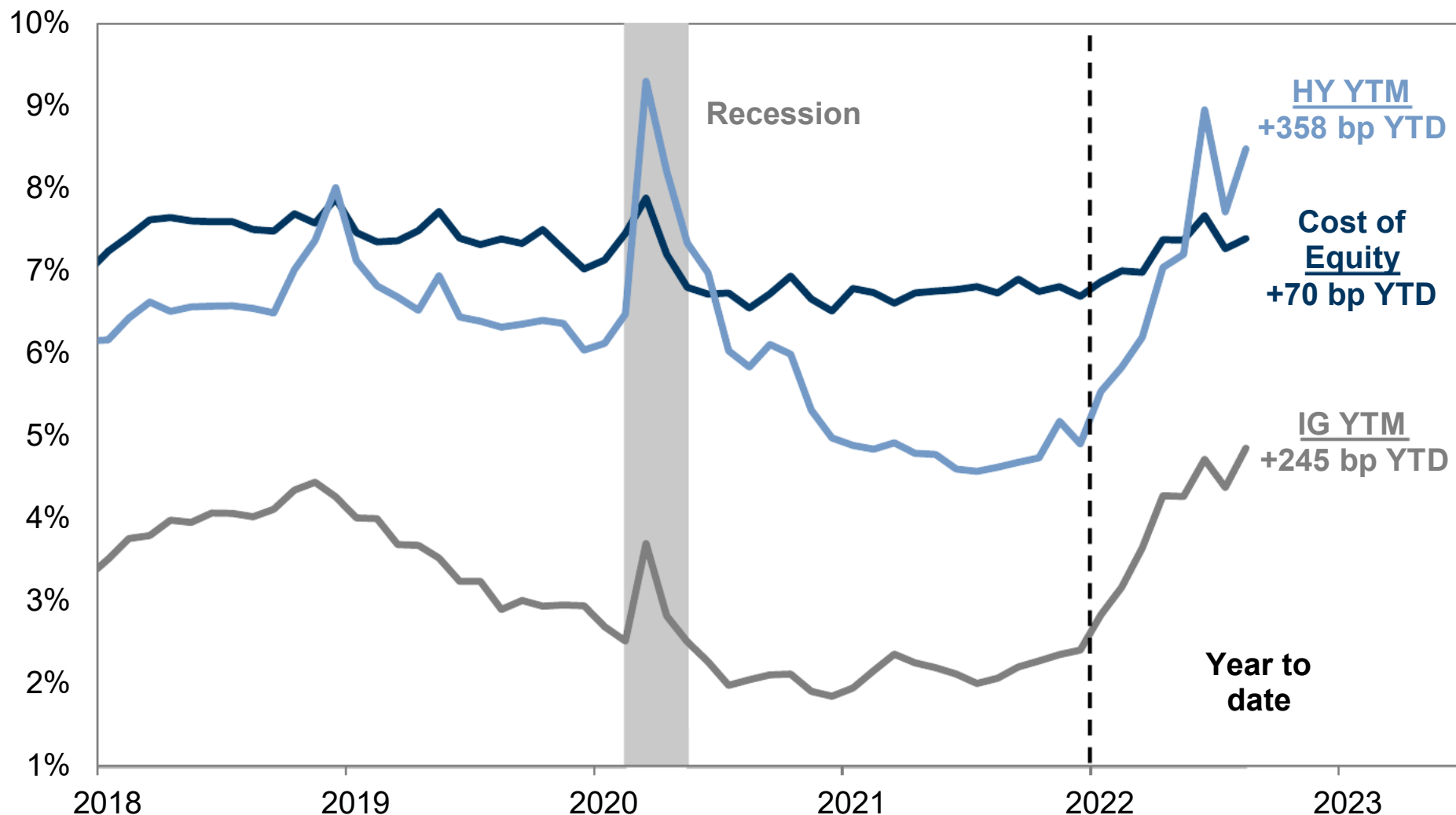
| Company | Ticker | Market Cap (\$bn) | Non-U.S. Sales |
|-----------------------|--------|-------------------|----------------|
| FINANCIALS | | | |
| Aflac Inc. | AFL | \$38 | 70 % |
| MSCI Inc. | MSCI | 37 | 59 |
| Aon Plc | AON | 59 | 55 |
| Everest Re Group | RE | 11 | 54 |
| Marsh & McLennan Cos. | MMC | 80 | 53 |
| Citigroup Inc. | C | 95 | 52 |
| Sector median | | | 7 % |
| HEALTH CARE | | | |
| Viatis Inc. | VTRS | \$11 | 77 % |
| Waters Corp. | WAT | 18 | 72 |
| Mettler-Toledo Intl | MTD | 27 | 67 |
| Agilent Technologies | A | 38 | 66 |
| DENTSPLY SIRONA | XRAY | 7 | 65 |
| Abbott Laboratories | ABT | 179 | 61 |
| PerkinElmer Inc. | PKI | 17 | 60 |
| Sector median | | | 39 % |
| INDUSTRIALS | | | |
| Otis Worldwide | OTIS | \$30 | 74 % |
| Expeditors Intl | EXPD | 17 | 74 |
| Caterpillar Inc. | CAT | 96 | 62 |
| 3M Co. | MMM | 69 | 58 |
| Sector median | | | 31 % |

| Company | Ticker | Market Cap (\$bn) | Non-U.S. Sales |
|-------------------------------|--------|-------------------|----------------|
| INFORMATION TECHNOLOGY | | | |
| Monolithic Power Systems | MPWR | \$20 | 97 % |
| Qualcomm Inc. | QCOM | 144 | 96 |
| Lam Research Corp. | LRCX | 60 | 95 |
| NXP Semiconductors | NXPI | 43 | 91 |
| Applied Materials | AMAT | 81 | 91 |
| Texas Instruments | TXN | 150 | 90 |
| Teradyne Inc. | TER | 13 | 89 |
| KLA Corp. | KLAC | 50 | 89 |
| NVIDIA Corp. | NVDA | 342 | 84 |
| Intel Corp. | INTC | 128 | 82 |
| Broadcom Inc. | AVGO | 204 | 81 |
| IPG Photonics Corp. | IPGP | 5 | 78 |
| Microchip Technology | MCHP | 36 | 78 |
| Analog Devices Inc. | ADI | 78 | 67 |
| Sector median | | | 54 % |
| MATERIALS | | | |
| Newmont Corp. | NEM | \$33 | 99 % |
| Sector median | | | 57 % |
| REAL ESTATE | | | |
| Equinix Inc. | EQIX | \$57 | 61 % |
| Sector median | | | 0 % |
| UTILITIES | | | |
| AES Corp. | AES | \$17 | 68 % |
| Sector median | | | 0 % |
| GSTHINTL median | | | 73 % |
| S&P 500 median | | | 29 |

Repricing of growth

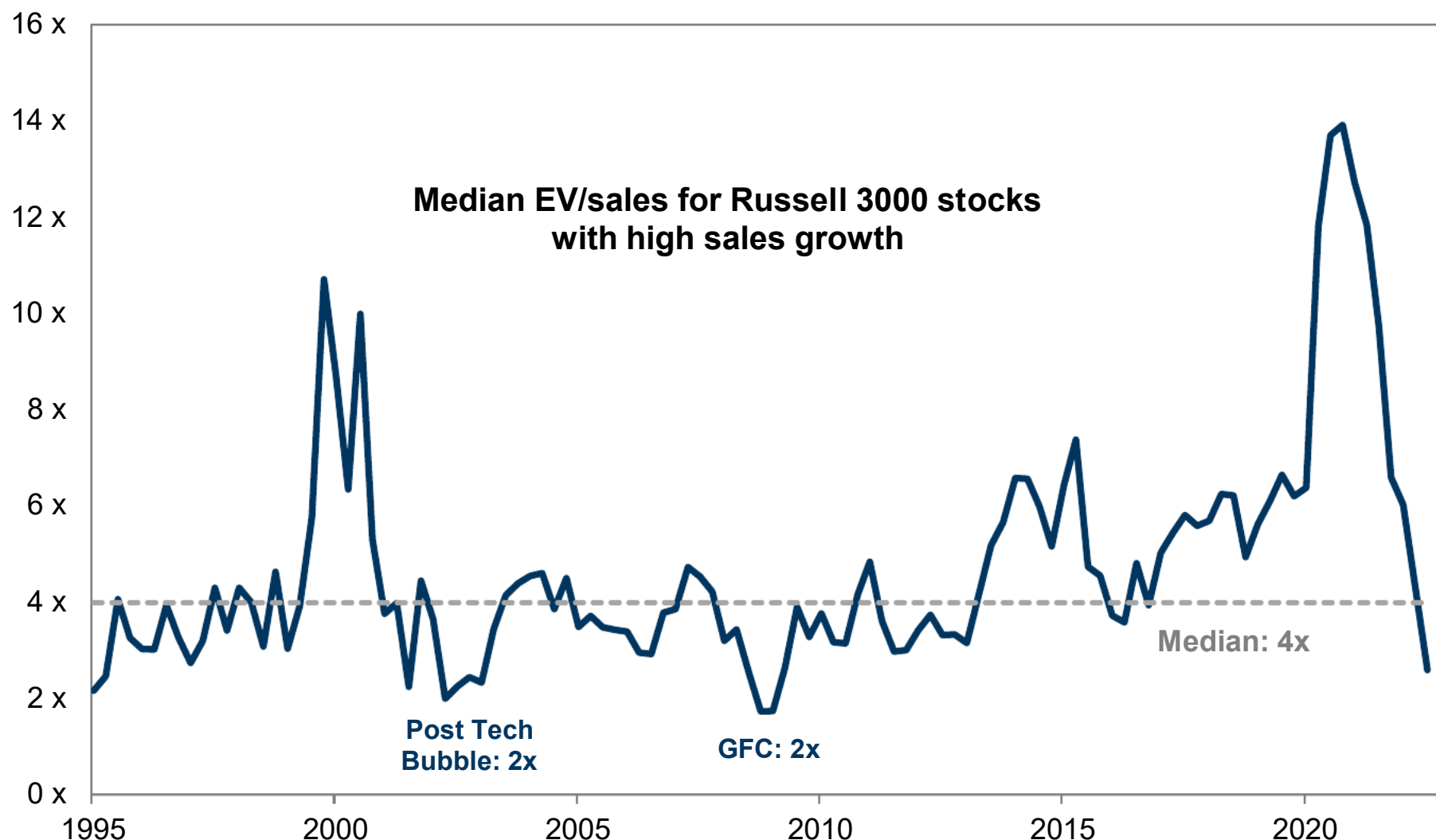
Cost of equity and cost of debt have both risen YTD

Sharp rise in financing costs make debt issuance a less attractive option



Valuation of high-growth stocks over time

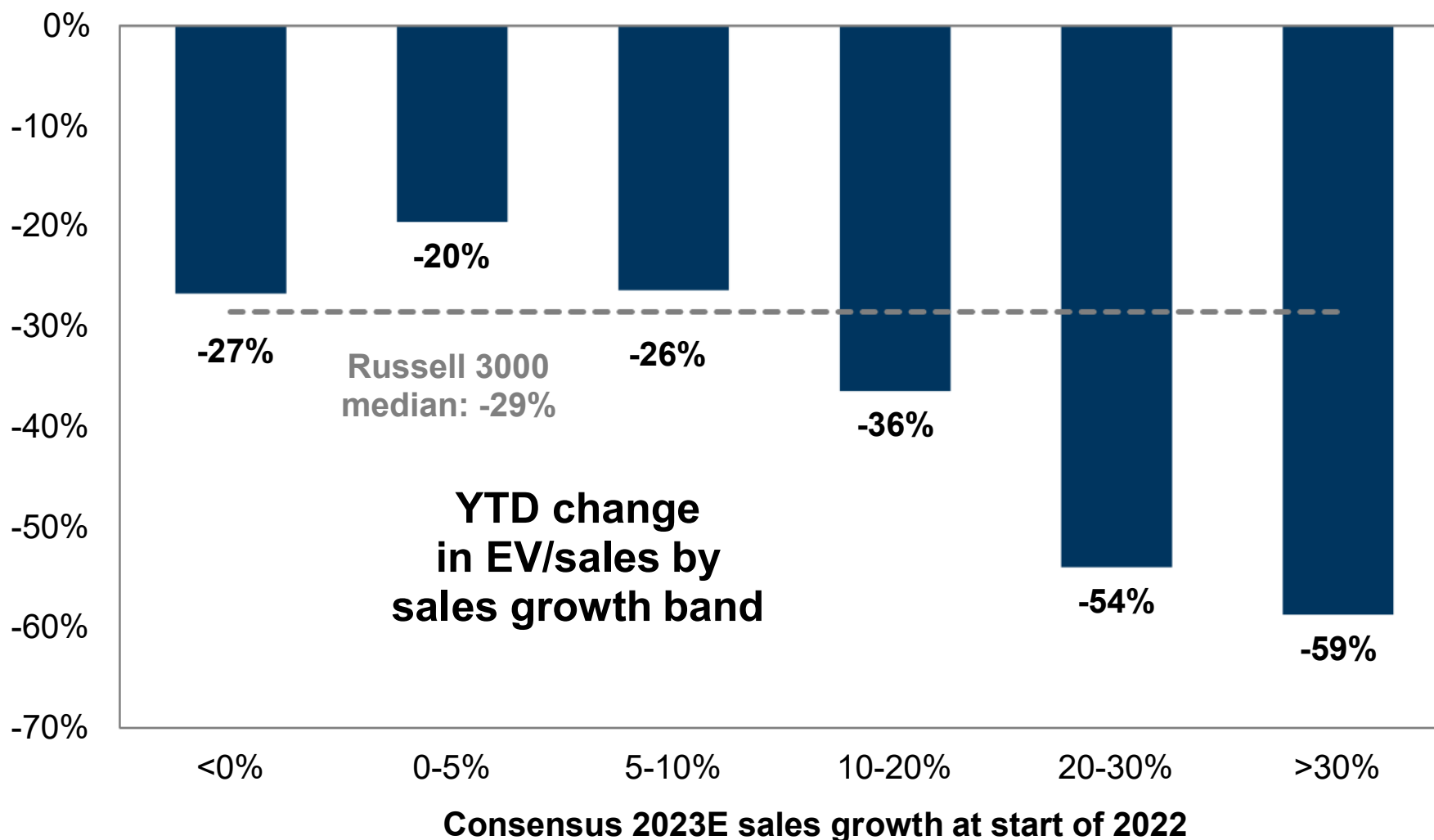
Median EV/sales for high-growth stocks has fallen below long-term average



"High growth" stocks rank in top 10% of Russell 3000 based on 3-year average realized sales growth and have positive sales growth in each of last three years (or most recent year if history unavailable).

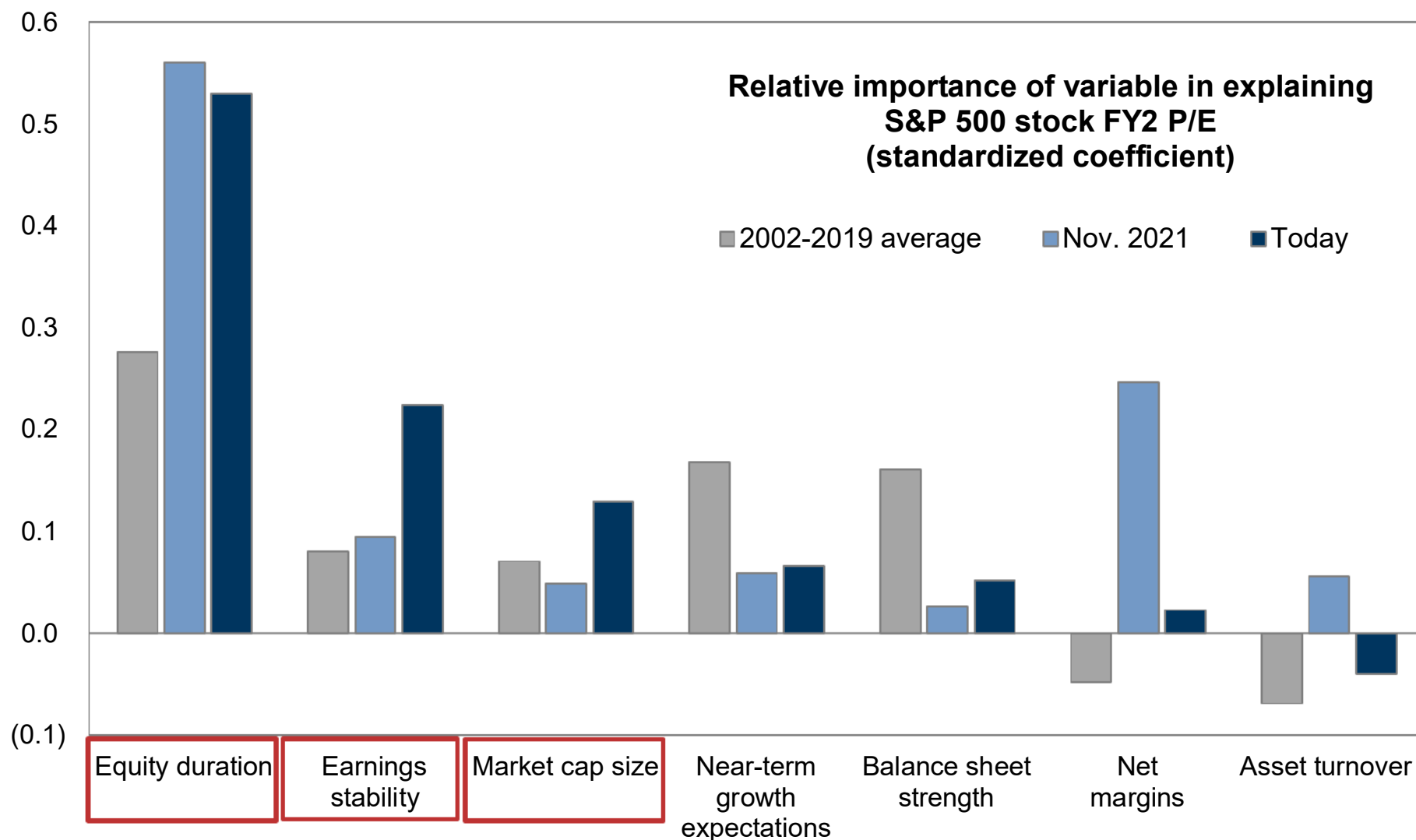
EV/sales de-rating by 2023 sales growth cohort

Valuation de-rating has been most pronounced among high growth stocks



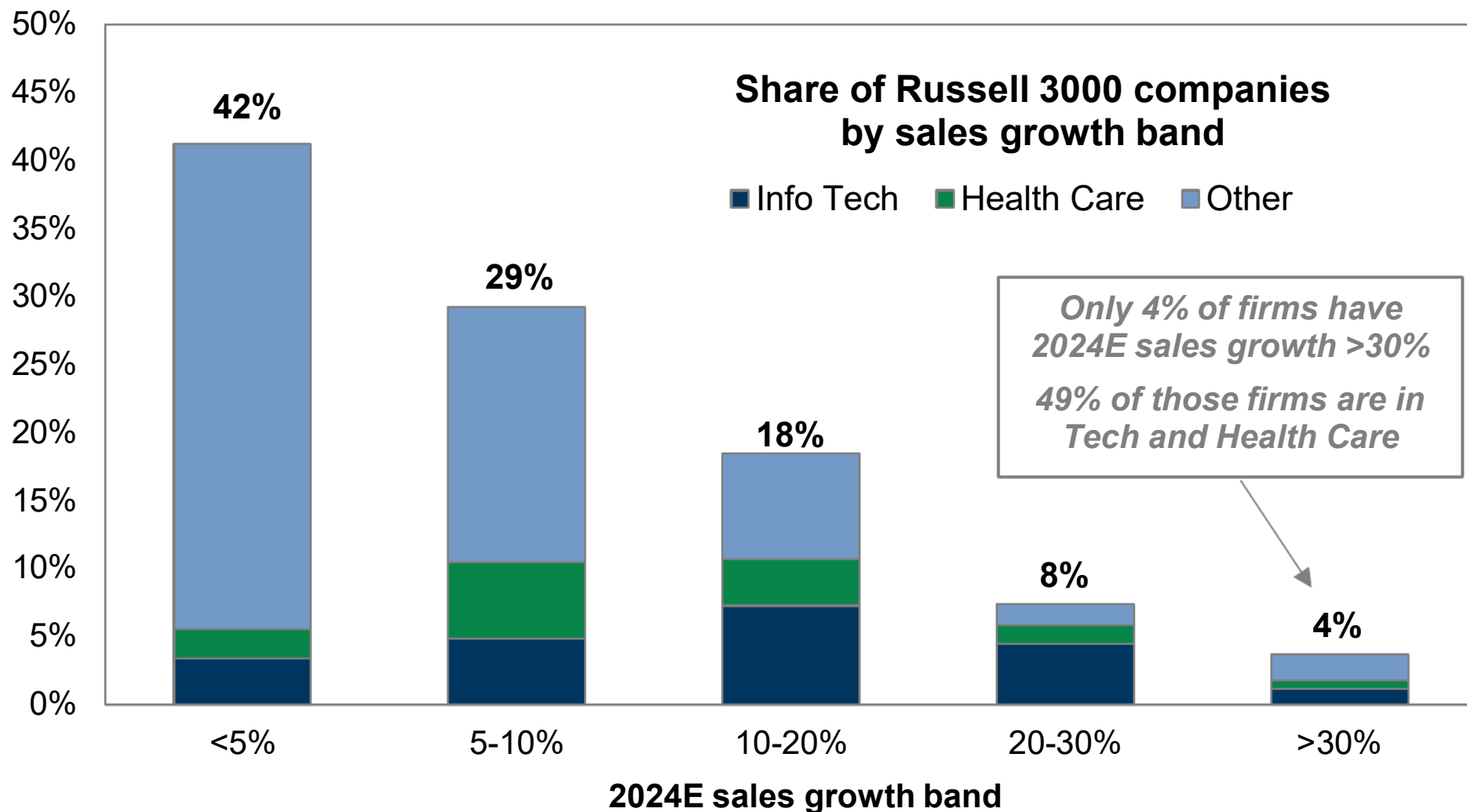
What investors pay for: today vs. history

Relative importance of variable in explaining current S&P 500 stock P/E multiples



Distribution of 2024E sales growth for R3000 stocks

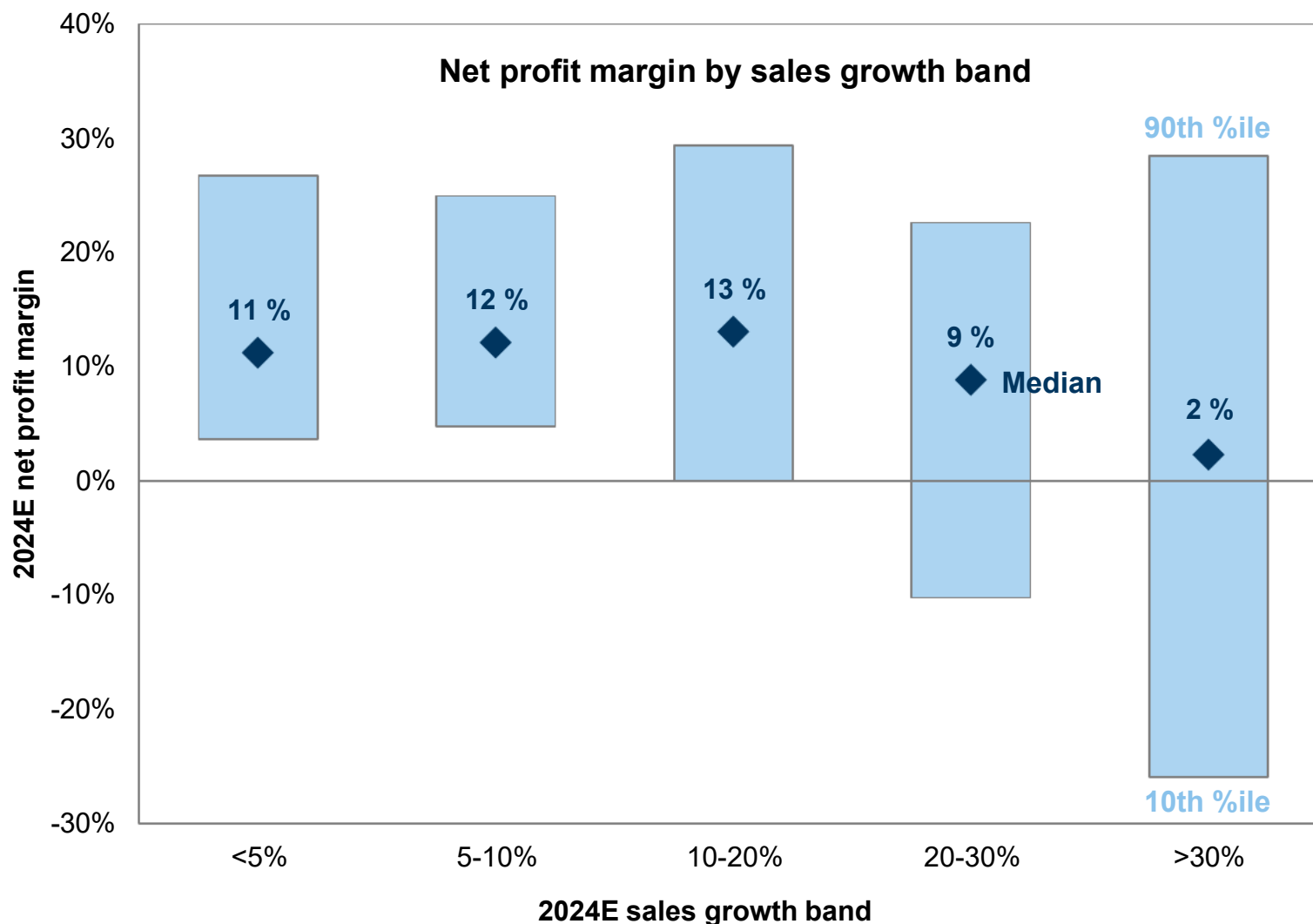
71% of Russell 3000 companies expected to grow sales by less than 10%



Russell 3000 stocks over \$2 billion in market cap, excluding Financials and Biotechnology.

Russell 3000 margins by sales growth band

Stocks with higher expected sales growth generally have lower margins



Russell 3000 stocks over \$2 billion in market cap, excluding Financials and Biotechnology.

Valuation of sales growth vs. margins

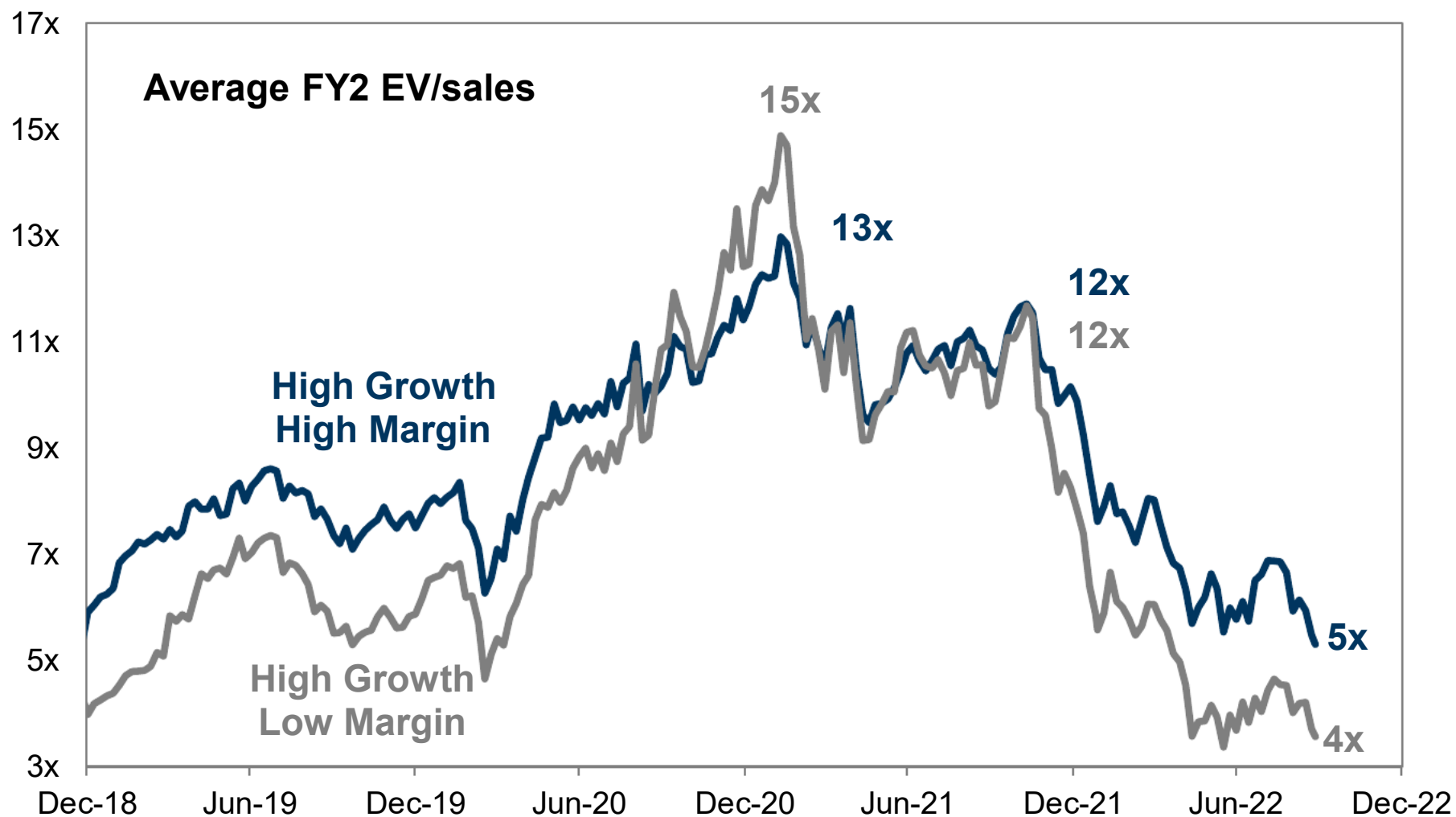
It is unusual, but 3,000 US stocks are currently almost perfectly well-ordered

Average FY2 EV/sales multiple

| | | Sales growth (2024E) | | | |
|----------------|--------|----------------------|-------|--------|-------|
| | | <5% | 5-10% | 10-20% | >20% |
| Margin (2024E) | <5% | 0.8 x | 1.1 x | 3.4 x | 4.5 x |
| | 5-10% | 1.4 | 1.8 | 2.8 | 4.5 |
| | 10-20% | 2.7 | 2.8 | 4.1 | 7.0 |
| | >20% | 3.7 | 5.4 | 6.1 | 7.3 |

Valuation of high- and low-margin growth stocks

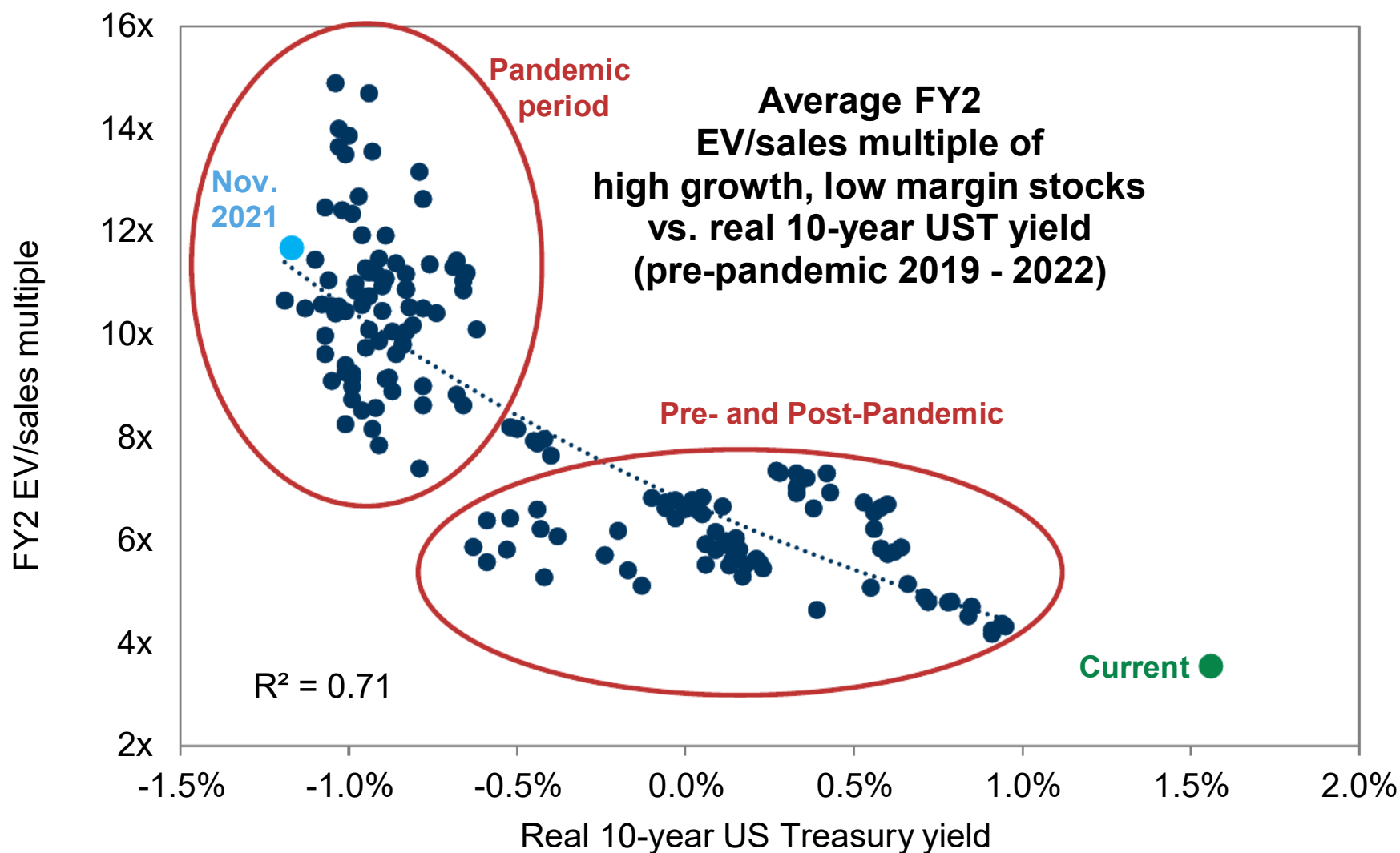
High growth, low margin stocks have de-rated by 67% since November



Note: "High Growth High Margin" uses >15% sales growth as a cutoff.

Valuation of high-growth, low-margin stocks vs. rates

Jump in real Treasury yield corresponded with dramatic valuation contraction



High-growth stocks with near term path to profitability

20%+ forecast sales growth & EV/sales below historical growth stock median (4x)

| Ticker | Name | Sector | Mkt cap \$ billion | YTD return | Sales growth | | EPS | | LTM EV/sales | |
|--------|-------------------------------------|------------------------|-----------------------|---------------|--------------|------|---------|---------|--------------|---------|
| | | | | | 2022 | 2023 | 1Q 2022 | 4Q 2022 | Nov '21 | Current |
| LOVE | Lovesac Company | Consumer Discretionary | 0.3 | (69)% | 33 % | 20 % | \$0.1 | \$2.7 | 3.2 x | 0.7 x |
| CARG | CarGurus, Inc. | Communication Services | 1.8 | (56) | 100 | 24 | 0.4 | 0.3 | 4.8 | 1.0 |
| LYFT | Lyft, Inc. | Industrials | 4.9 | (67) | 27 | 22 | 0.1 | 0.1 | 4.5 | 1.1 |
| VITL | Vital Farms, Inc. | Consumer Staples | 0.5 | (35) | 33 | 22 | 0.0 | 0.0 | 2.5 | 1.2 |
| RIOT | Riot Blockchain Inc | Information Technology | 1.0 | (72) | 47 | 76 | 0.3 | 0.0 | 12.3 | 1.2 |
| VERI | Veritone, Inc. | Information Technology | 0.2 | (75) | 33 | 15 | (0.2) | 0.1 | 10.3 | 1.2 |
| SNCY | Sun Country Airlines Holdings, Inc. | Industrials | 0.9 | (46) | 41 | 18 | 0.2 | 0.1 | 3.4 | 1.5 |
| CANO | Cano Health, Inc. | Health Care | 2.1 | (0) | 77 | 32 | 0.0 | (0.0) | 1.8 | 1.7 |
| ACMR | ACM Research, Inc. | Information Technology | 0.8 | (51) | 49 | 29 | (0.0) | 0.3 | 11.1 | 1.8 |
| ROVR | Rover Group, Inc. | Consumer Discretionary | 0.6 | (67) | 50 | 37 | (0.1) | (0.0) | 5.5 | 2.1 |
| ZYXI | Zynex, Inc. | Health Care | 0.3 | (7) | 22 | 25 | 0.0 | 0.2 | 3.5 | 2.3 |
| NGMS | NeoGames SA | Consumer Discretionary | 0.3 | (53) | 139 | 57 | (0.0) | 0.2 | 13.1 | 2.5 |
| APPS | Digital Turbine, Inc. | Information Technology | 1.5 | (76) | 20 | 15 | 0.4 | 0.4 | 10.9 | 2.5 |
| OPRX | OptimizeRx Corporation | Health Care | 0.2 | (78) | 4 | 26 | (0.0) | 0.2 | 27.0 | 2.6 |
| JYNT | Joint Corp | Health Care | 0.2 | (76) | 24 | 22 | (0.0) | 0.1 | 17.1 | 2.6 |
| RNG | RingCentral, Inc. | Information Technology | 3.9 | (78) | 26 | 22 | 0.4 | 0.6 | 16.2 | 2.9 |
| PUBM | PubMatic, Inc. | Communication Services | 0.9 | (52) | 23 | 19 | 0.1 | 0.4 | 7.4 | 2.9 |
| GDYN | Grid Dynamics Holdings, Inc. | Information Technology | 1.3 | (53) | 46 | 22 | 0.1 | 0.1 | 7.8 | 3.6 |

Stocks burning cash may need to raise capital soon

Stocks with high cash burn rates, EV/sales above 5x, and 20%+ sales growth

| Ticker | Name | Industry | Mkt cap (\$ mn) | LTM EV/sales | | | 2023E sales growth | Trailing EPS | Estimated monthly cash burn (\$ mn) | Current cash balance (\$ mn) | Months of runway |
|--------|---|--|--------------------|--------------|--------|------------|--------------------------|-----------------|--|---------------------------------------|---------------------|
| | | | | Nov-21 (x) | Sep-22 | Change (%) | | | | | |
| PHAT | Phathom Pharmaceuticals, Inc. | Pharmaceuticals | 376 | NA | 255 x | NA | 3879 % | \$(4) | \$(12) | \$ 207 | 17 |
| BLUE | bluebird bio, Inc. | Biotechnology | 433 | 10 | 122 | 1124 | 1452 | (8) | (18) | 134 | 7 |
| TGTX | TG Therapeutics, Inc. | Biotechnology | 834 | 423 | 65 | (85) | 539 | (2) | (27) | 196 | 7 |
| AGIO | Agios Pharmaceuticals, Inc. | Biotechnology | 1589 | 54 | 63 | 16 | 239 | (7) | (86) | 819 | 10 |
| PRVB | Provention Bio, Inc. | Pharmaceuticals | 341 | 79 | 56 | (29) | 1196 | (2) | (9) | 85 | 9 |
| AXSM | Axsome Therapeutics, Inc. | Pharmaceuticals | 2026 | 3596 | 55 | (98) | 299 | (4) | (10) | 73 | 8 |
| RIDE | Lordstown Motors Corp. | Automobiles | 364 | 96 | 25 | (74) | 1130 | (1) | (53) | 236 | 4 |
| NKLA | Nikola Corporation | Machinery | 1686 | 1112 | 19 | (98) | 484 | (1) | (50) | 442 | 9 |
| RVNC | Revance Therapeutics, Inc. | Pharmaceuticals | 1829 | 15 | 18 | 19 | 81 | (3) | (20) | 234 | 12 |
| BPMC | Blueprint Medicines Corp. | Biotechnology | 3916 | 22 | 18 | (17) | 65 | (12) | (58) | 853 | 15 |
| NOVA | Sunnova Energy International Inc | Ind. Power & Renewable Elec. Producers | 2835 | 34 | 18 | (48) | 37 | (1) | (105) | 262 | 2 |
| GBT | Global Blood Therapeutics Inc | Biotechnology | 4587 | 12 | 17 | 45 | 55 | (5) | (40) | 517 | 13 |
| BILL | Bill.com Holdings, Inc. | Software | 13183 | 78 | 17 | (78) | 40 | (0) | (160) | 2790 | 17 |
| RADI | Radius Global Infrastructure, Inc. | Diversified Telecom Services | 1099 | 20 | 17 | (17) | 31 | (0) | (38) | 491 | 13 |
| APPH | AppHarvest, Inc. | Food Products | 203 | 48 | 16 | (67) | 353 | (2) | (26) | 99 | 4 |
| CHPT | ChargePoint Holdings, Inc. | Electrical Equip | 5013 | 25 | 12 | (51) | 58 | (1) | (35) | 472 | 14 |
| INSM | Insmed Incorporated | Biotechnology | 2584 | 17 | 12 | (30) | 37 | (4) | (42) | 555 | 13 |
| PCOR | Procore Technologies Inc | Software | 6947 | NA | 10 | NA | 23 | (1) | (43) | 563 | 13 |
| NCNO | nCino Inc | Software | 3767 | 27 | 10 | (64) | 27 | (0) | (25) | 86 | 3 |
| GTHX | G1 Therapeutics, Inc. | Biotechnology | 531 | 13 | 10 | (26) | 56 | (4) | (12) | 144 | 12 |
| PACB | Pacific Biosciences of California, Inc. | Life Sciences Tools & Services | 1185 | 45 | 9 | (80) | 31 | (1) | (67) | 899 | 13 |
| ESPR | Esperion Therapeutics, Inc. | Pharmaceuticals | 446 | 7 | 9 | 27 | 113 | (6) | (24) | 186 | 8 |
| FUV | Arcimoto, Inc. | Automobiles | 68 | 65 | 8 | (88) | 411 | (2) | (5) | 5 | 1 |
| FNA | Paragon 28, Inc. | Health Care Equip & Supplies | 1339 | NA | 8 | NA | 20 | (0) | (8) | 73 | 10 |
| XMTR | Xometry, Inc. | Internet & Direct Marketing Retail | 2838 | NA | 8 | NA | 39 | (1) | (48) | 357 | 7 |
| U | Unity Software, Inc. | Software | 9991 | 40 | 8 | (80) | 28 | (0) | (142) | 1754 | 12 |
| DNMR | Danimer Scientific, Inc. | Chemicals | 315 | 25 | 8 | (70) | 175 | (1) | (36) | 140 | 4 |
| AKTS | Akoustis Technologies, Inc. | Electronic Equip | 172 | 27 | 7 | (73) | 98 | (1) | (6) | 80 | 14 |
| QTNT | Quotient Ltd. | Health Care Equip & Supplies | 24 | 11 | 7 | (37) | 33 | (1) | (6) | 49 | 8 |
| NCMI | National CineMedia, Inc. | Media | 73 | 11 | 5 | (48) | 33 | (0) | (8) | 73 | 9 |
| RXST | RxSight, Inc. | Health Care Equip & Supplies | 314 | NA | 5 | NA | 79 | (2) | (11) | 129 | 12 |
| BTRS | BTRS Holdings, Inc. | Software | 946 | 7 | 5 | (29) | 22 | (0) | (13) | 148 | 11 |
| EOSE | Eos Energy Enterprises, Inc. | Electrical Equip | 106 | 141 | 5 | (96) | 281 | (3) | (14) | 18 | 1 |
| NCLH | Norwegian Cruise Line Holdings Ltd. | Hotels Restaurants & Leisure | 5710 | 21 | 5 | (77) | 69 | (7) | (231) | 1903 | 8 |
| RCL | Royal Caribbean Group | Hotels Restaurants & Leisure | 11330 | 23 | 5 | (79) | 42 | (16) | (351) | 2102 | 6 |

Note: Monthly cash burn rate calculated as difference between cash on balance sheet in 1Q 2022 vs. 1Q 2021 divided by 12

Sectors

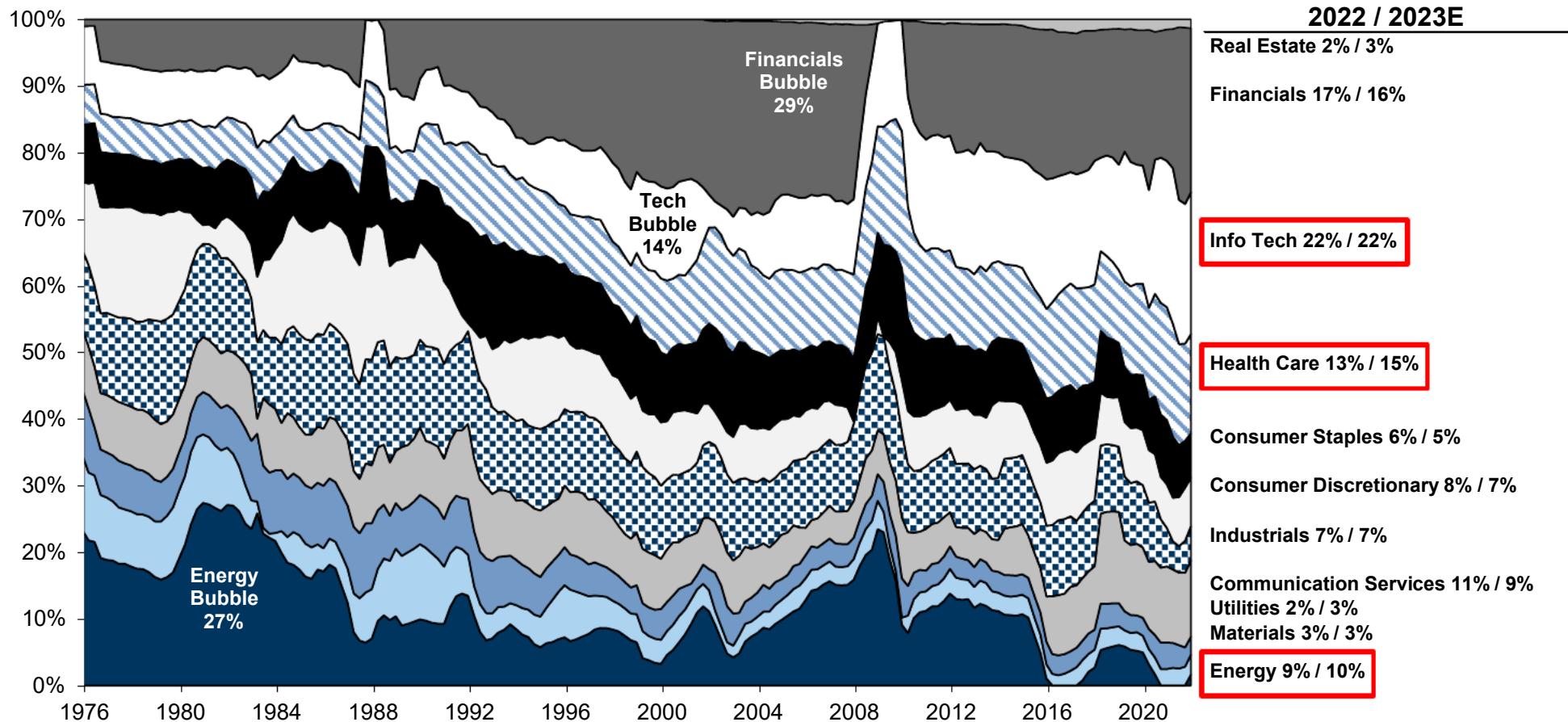
GS US Portfolio Strategy Sector Recommendations

Overweight Energy, Information Technology, and Health Care

| Sectors | Goldman Sachs Weighting | S&P 500 Wgt | YTD |
|--------------------|-------------------------|-------------|--------------|
| Energy | Overweight | 5% | 42 % |
| Health Care | | 15 | (11) |
| Info Tech | | 27 | (27) |
| Industrials | Neutral | 8 | (17) |
| Financials | | 11 | (18) |
| Materials | | 2 | (22) |
| Cons. Services | | 2 | (22) |
| Real Estate | | 3 | (25) |
| Retailing | | 6 | (28) |
| Cons. Durables | | 1 | (38) |
| Media & Ent. | | 7 | (39) |
| Utilities | Underweight | 3 | 4 |
| Consumer Staples | | 7 | (7) |
| Telecom Svcs. | | 1 | (11) |
| Autos & Comp. | | 3 | (22) |
| S&P 500 | | 100% | (20)% |

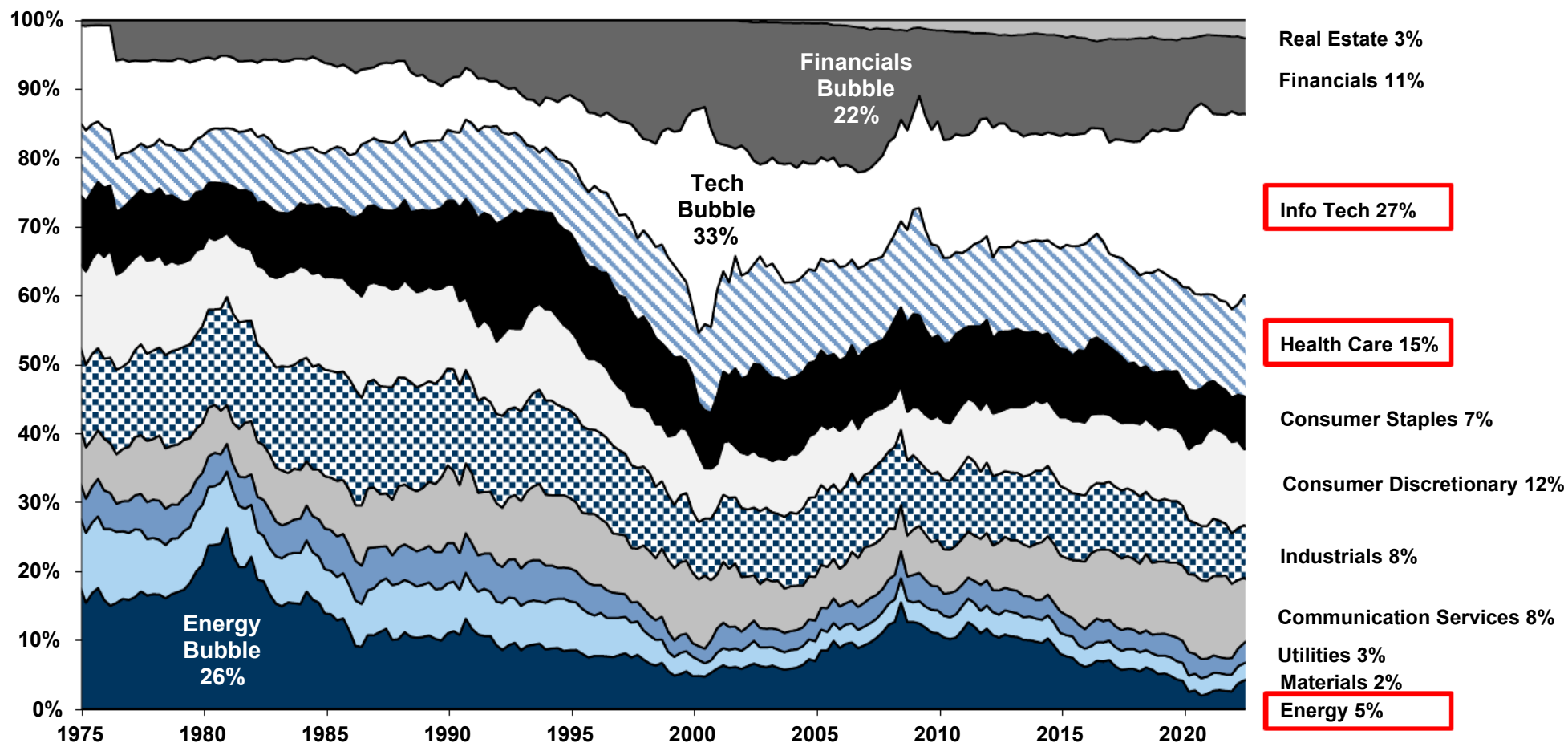
Sector share of S&P 500 *net income* since 1975

Energy share rising to 10% by 2023 while Financials share declining to 16%



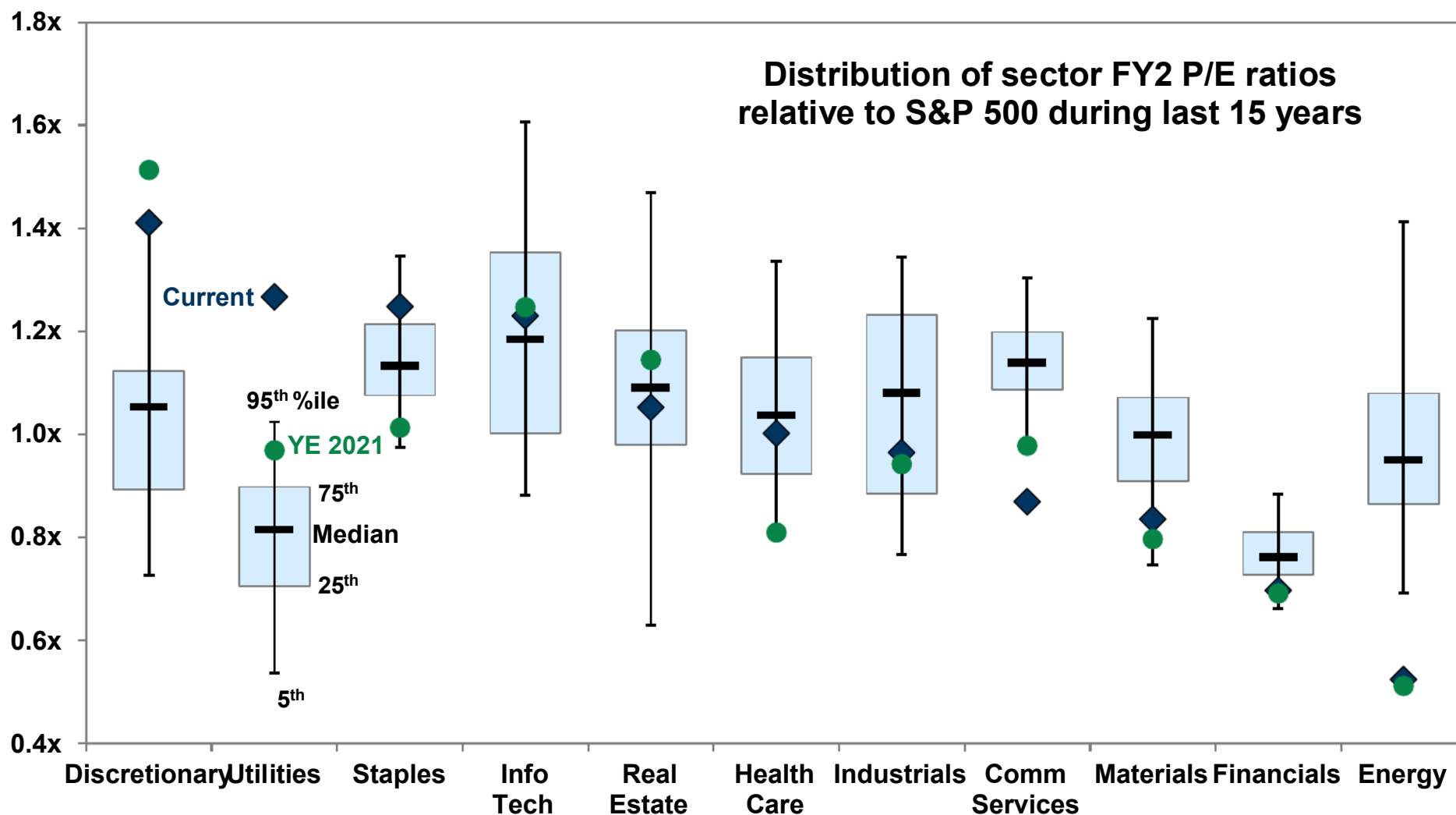
Sector share of S&P 500 equity cap since 1975

Tech accounted for 33% of S&P 500 equity capitalization at bubble peak in 2000



Distribution of sector historical relative P/E multiples

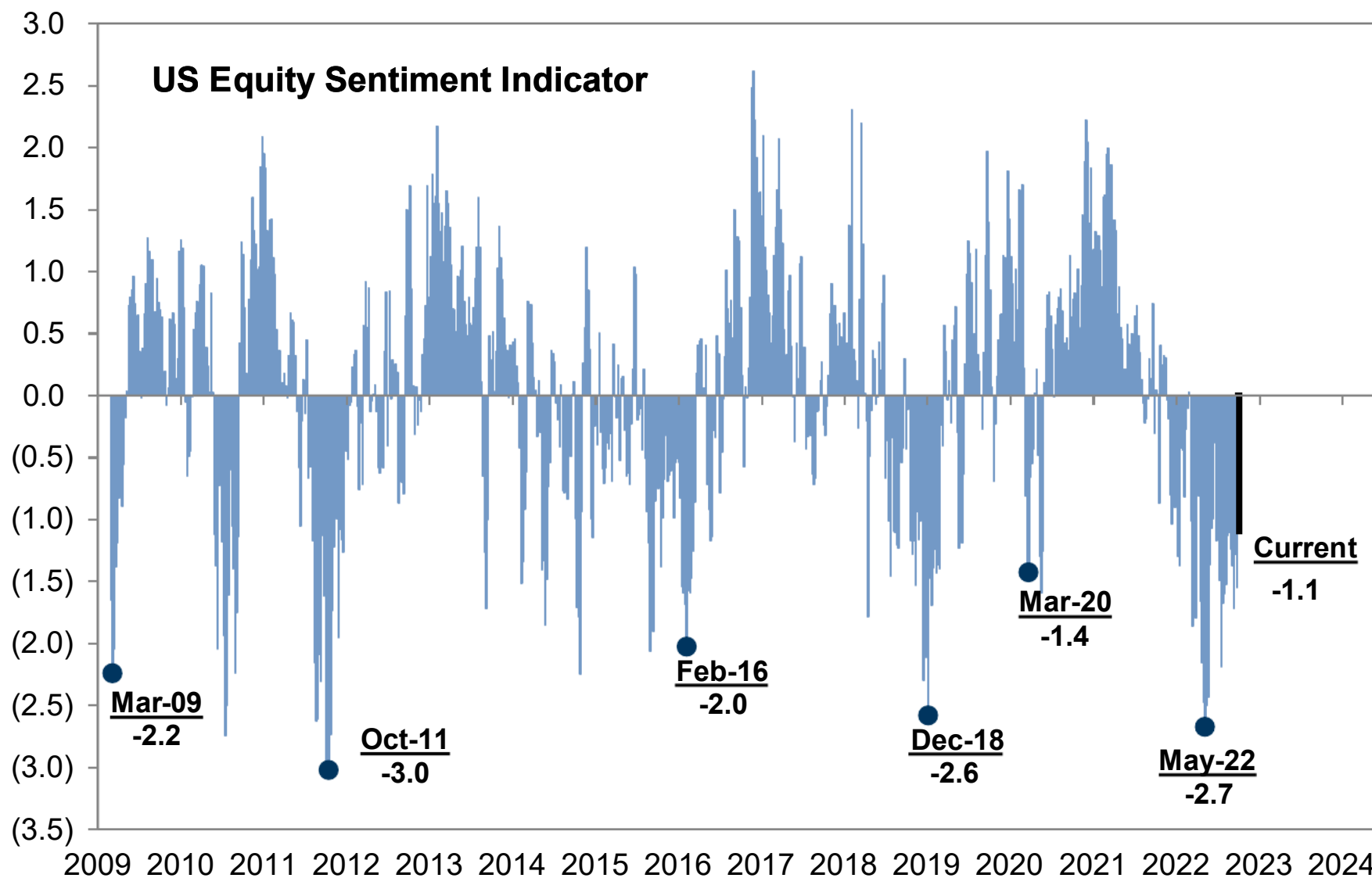
Index-relative valuations vary across sectors



Investor positioning

Sentiment Indicator is below average

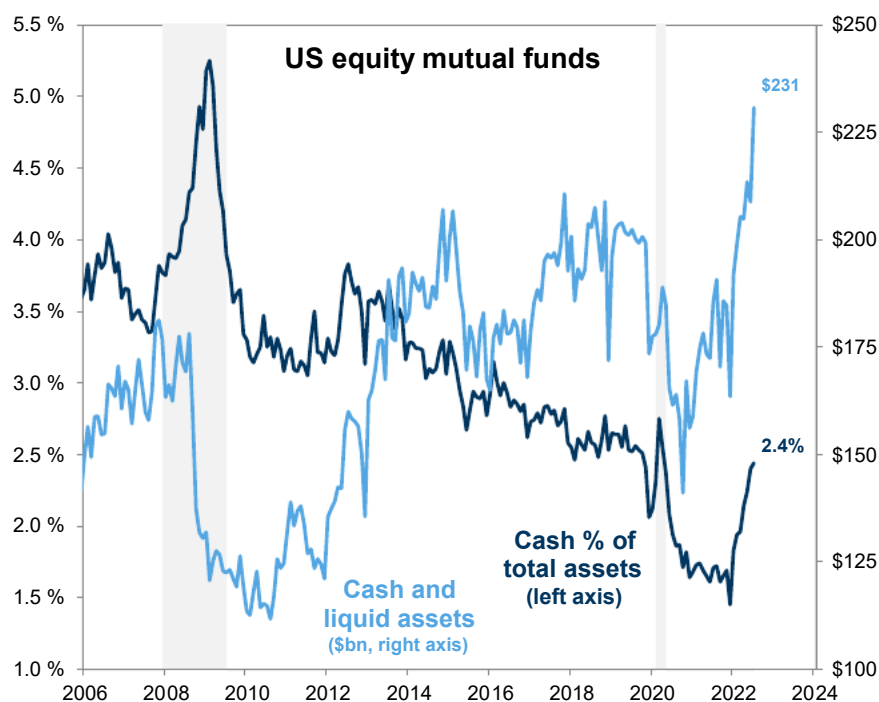
Investor positioning is 1.1 standard deviations below average



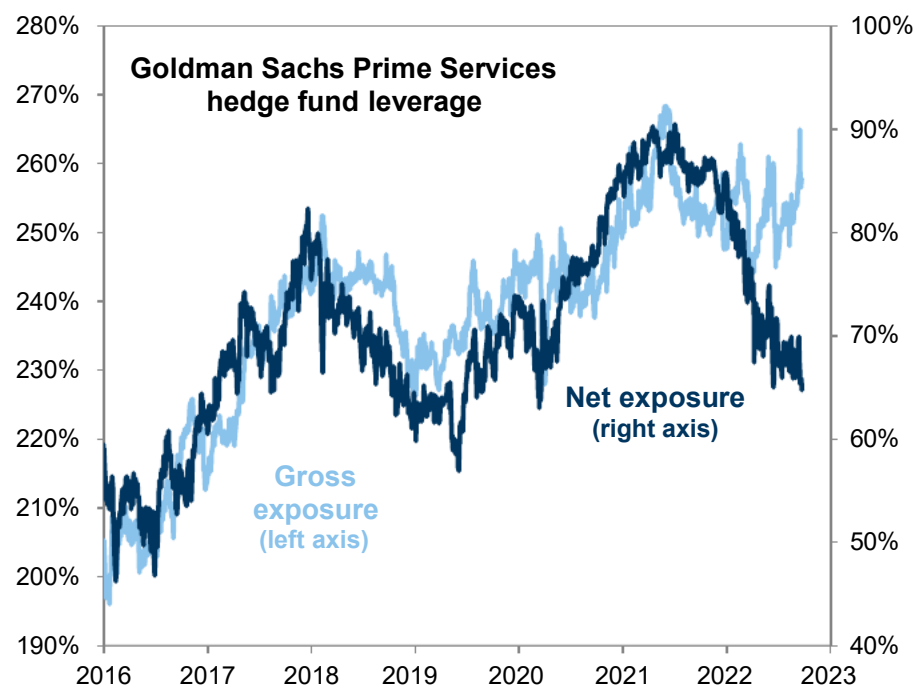
Mutual and hedge funds conservatively positioned

Increased equity mutual fund cash position and reduced hedge fund net leverage

Mutual fund cash balances



Hedge fund net leverage



Hedge Fund long stock-picking alpha generation

39 bp quarterly excess return with 59% outperformance hit rate since 2001

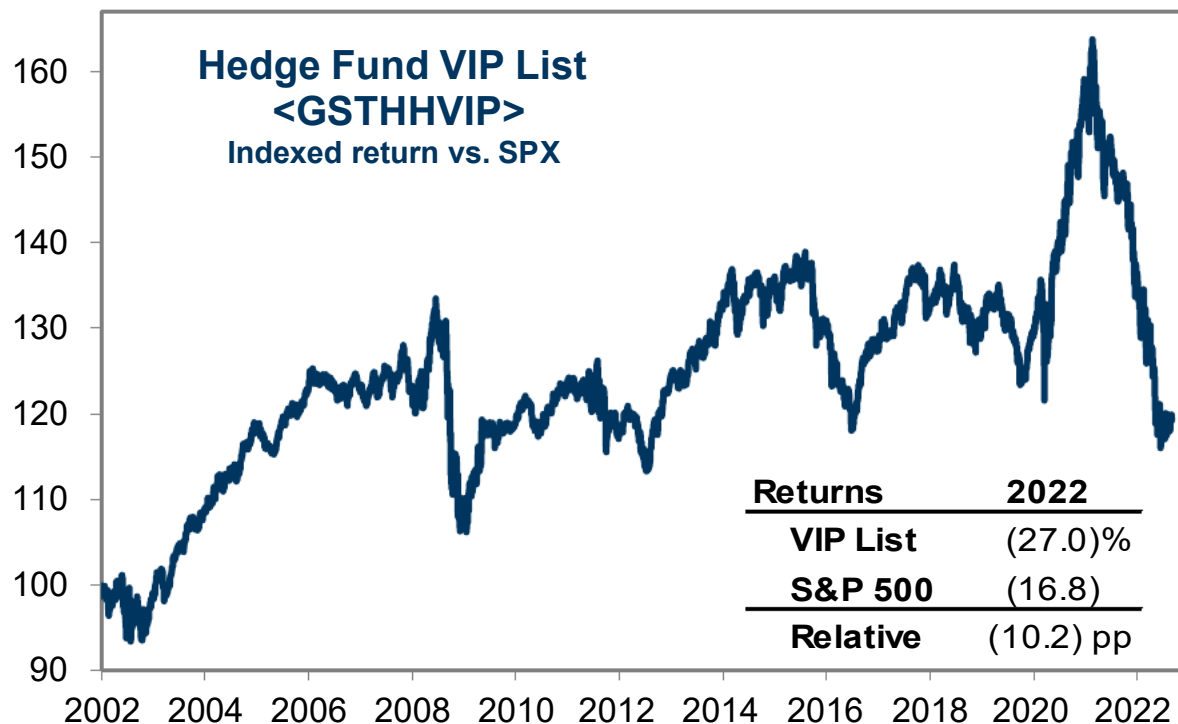
Hedge Fund VIP List Bloomberg <GSTHHVIP>

Quarterly Excess Return vs. SPX

| | |
|--------------------|--------|
| Maximum | 868 bp |
| 75th Percentile | 201 |
| Median | 69 |
| 25th Percentile | (148) |
| Minimum | (1051) |
| Standard Deviation | 339 |

| | |
|--------------------------|--------------|
| Avg Excess Return | 39 bp |
| Information Ratio | 0.12 |

Hit rate of outperformance 59 %
since May 2001



Hedge Fund very important position list (GSTHHVIP)

50 stocks that “matter most” to the performance of long/short hedge funds

| Company | Ticker | Sub-sector | Equity cap (\$ bn) | No. of funds with 10 to 200 positions owning stock 30-Jun-22 | No. of funds with stock as top 10 holding 30-Jun-22 | Average portfolio weight when stock ranks among top 10 holdings | % of equity cap owned by hedge funds 30-Jun-22 | Total return YTD |
|---|-------------|---|--------------------|--|---|---|--|------------------|
| Amazon.com Inc. | AMZN | Internet & Direct Marketing Retail | \$1,448 | 144 | 92 | 9 % | 1 % | (15)% |
| Microsoft Corp. | MSFT | Systems Software | 2,170 | 139 | 84 | 8 | 1 | (13) |
| Alphabet Inc. | GOOGL | Interactive Media & Services | 1,478 | 103 | 55 | 6 | 2 | (17) |
| Meta Platforms Inc. | META | Interactive Media & Services | 401 | 111 | 51 | 7 | 3 | (48) |
| Visa Inc. | V | Data Processing & Outsourced Services | 354 | 82 | 37 | 6 | 3 | (0) |
| Apple Inc. | AAPL | Technology Hardware Storage & Peripherals | 2,819 | 59 | 36 | 7 | 0 | (2) |
| Uber Technologies | UBER | Trucking | 59 | 65 | 34 | 9 | 11 | (28) |
| Mastercard Inc. | MA | Data Processing & Outsourced Services | 345 | 69 | 25 | 9 | 2 | (0) |
| Berkshire Hathaway | BRK.B | Multi-Sector Holdings | 671 | 46 | 22 | 8 | 1 | 2 |
| ServiceNow Inc. | NOW | Systems Software | 98 | 51 | 19 | 7 | 4 | (25) |
| T-Mobile US Inc. | TMUS | Wireless Telecommunication Services | 184 | 46 | 19 | 7 | 3 | 27 |
| UnitedHealth Group | UNH | Managed Health Care | 512 | 41 | 18 | 6 | 1 | 9 |
| Fiserv Inc. | FISV | Data Processing & Outsourced Services | 71 | 32 | 17 | 7 | 6 | 7 |
| Salesforce Inc. | CRM | Application Software | 187 | 60 | 17 | 6 | 2 | (26) |
| Biohaven Pharmaceutical Holding Company Ltd. | BHVN | Biotechnology | 11 | 28 | 16 | 14 | 24 | 7 |
| Booking Holdings | BKNG | Hotels Resorts & Cruise Lines | 87 | 38 | 16 | 5 | 4 | (11) |
| CrowdStrike Holdings | CRWD | Systems Software | 45 | 30 | 16 | 6 | 10 | (4) |
| Palo Alto Networks | PANW | Systems Software | 52 | 37 | 16 | 7 | 6 | (7) |
| Zendesk Inc. | ZEN | Application Software | 9 | 39 | 16 | 8 | 26 | (26) |
| Activision Blizzard | ATVI | Interactive Home Entertainment | 63 | 37 | 15 | 7 | 6 | 22 |
| Cheniere Energy | LNG | Oil & Gas Storage & Transportation | 42 | 27 | 15 | 7 | 7 | 66 |
| RH | RH | Homefurnishing Retail | 7 | 30 | 15 | 6 | 25 | (42) |
| Atlassian Corp. | TEAM | Application Software | 72 | 24 | 14 | 7 | 10 | (26) |
| Frontier Communications Parent | FYBR | Integrated Telecommunication Services | 6 | 19 | 14 | 15 | 51 | (11) |
| Advanced Micro Devices | AMD | Semiconductors | 163 | 39 | 13 | 9 | 2 | (30) |
| Apollo Global Mgmt | APO | Other Diversified Financial Services | 34 | 29 | 13 | 11 | 3 | (16) |
| Builders FirstSource | BLDR | Building Products | 12 | 27 | 13 | 9 | 17 | (20) |
| Centene Corp. | CNC | Managed Health Care | 56 | 24 | 13 | 4 | 5 | 16 |
| Five9 Inc. | FIVN | Application Software | 8 | 25 | 13 | 7 | 19 | (18) |
| GoDaddy Inc. | GDDY | Internet Services & Infrastructure | 13 | 19 | 13 | 10 | 13 | (3) |
| Humana Inc. | HUM | Managed Health Care | 63 | 24 | 13 | 5 | 5 | 7 |
| MercadoLibre, Inc. | MELI | Internet & Direct Marketing Retail | 46 | 25 | 13 | 7 | 4 | (28) |
| PayPal Holdings | PYPL | Data Processing & Outsourced Services | 116 | 43 | 13 | 7 | 4 | (47) |
| Wells Fargo & Co. | WFC | Diversified Banks | 175 | 36 | 13 | 4 | 1 | (2) |
| WillScot Mobile Mini Hldgs | WSC | Construction & Engineering | 9 | 27 | 13 | 12 | 17 | 4 |
| Chesapeake Energy | CHK | Oil & Gas Exploration & Production | 12 | 29 | 12 | 10 | 25 | 70 |
| EQT Corp. | EQT | Oil & Gas Exploration & Production | 18 | 26 | 12 | 10 | 19 | 124 |
| Netflix Inc. | NFLX | Movies & Entertainment | 109 | 46 | 12 | 7 | 3 | (59) |
| Charter Communications | CHTR | Cable & Satellite | 77 | 26 | 11 | 6 | 4 | (30) |
| Danaher Corp. | DHR | Life Sciences Tools & Services | 214 | 28 | 11 | 5 | 2 | (10) |
| Elevance Health | ELV | Managed Health Care | 119 | 26 | 11 | 4 | 3 | 7 |
| Global Payments | GPN | Data Processing & Outsourced Services | 38 | 25 | 11 | 6 | 5 | (0) |
| Tesla Inc. | TSLA | Automobile Manufacturers | 941 | 28 | 11 | 12 | 1 | (14) |
| Crown Holdings, Inc. | CCK | Metal & Glass Containers | 12 | 22 | 10 | 8 | 10 | (8) |
| Charles Schwab | SCHW | Investment Banking & Brokerage | 138 | 29 | 10 | 7 | 2 | (9) |
| Walt Disney | DIS | Movies & Entertainment | 223 | 47 | 10 | 6 | 1 | (21) |
| Alibaba Group Hldg (ADR) | BABA | Internet & Direct Marketing Retail | 242 | 50 | 9 | 12 | 1 | (24) |
| Bank of America | BAC | Diversified Banks | 292 | 43 | 9 | 5 | 1 | (18) |
| Citigroup Inc. | C | Diversified Banks | 104 | 38 | 9 | 5 | 3 | (9) |
| Elastic NV | ESTC | Application Software | 8 | 19 | 9 | 6 | 12 | (34) |
| Average | | | \$289 | 43 | 20 | 8 % | 8 % | (7)% |
| Median | | | 82 | 34 | 13 | 7 | 4 | (11) |

Overlap in our hedge fund and mutual fund baskets

Hedge fund long and short vs. mutual fund overweight and underweight baskets

| | | Overlap with our MUTUAL FUND baskets | | | | | | | |
|--|-------|---|---------------|--------------|------------|--|-------------------------------|------------------------------------|--|
| | | <i>Overweight</i> | | | | <i>Underweight</i> | | | |
| | | Mutual Fund Overweight Positions <GSTHMFOW> | | | | Mutual Fund Underweight Positions <GSTHMFUW> | | | |
| Overlap with our HEDGE FUND baskets | Long | Hedge Fund VIP List <GSTHHVIP> | BAC V | FISV WDAY | MA | SQ | AAPL FB NFLX | AMZN GOOGL NVDA | BRK.B MSFT MU |
| | Short | Hedge Fund Very Important Short Positions <GSTHVISP> | ADBE CMCSA | C CSCO | DD QCOM | MS UNH | ABBV BA IBM NEE T | ABT COST INTC PEP TSLA | AMD CVX JNJ PFE WMT XOM |

Corporate use of cash

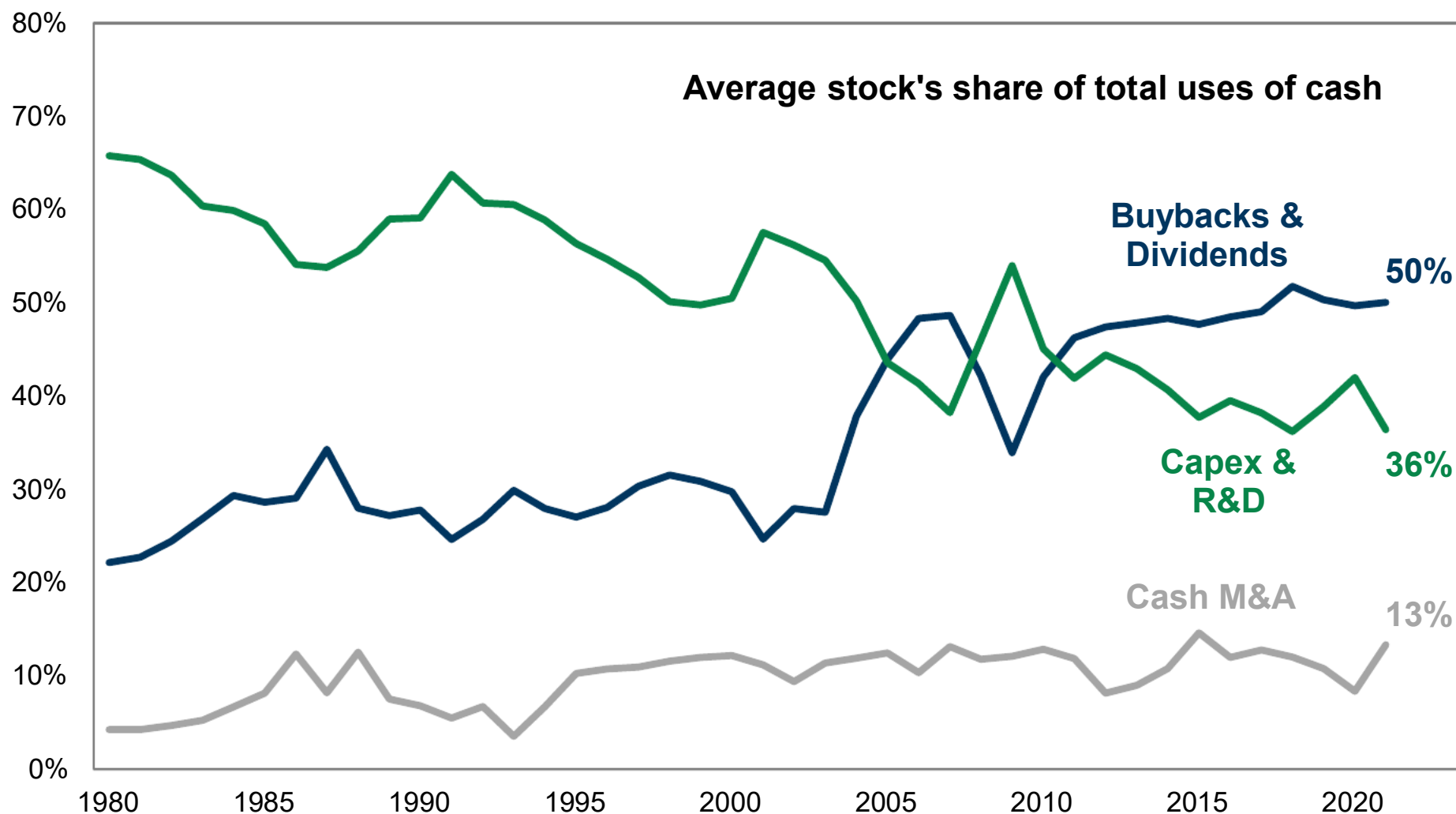
How S&P 500 companies spend cash

We expect buybacks will account for 30% of corporate cash use in 2022

| Cash Use (\$ billion) | 2018 | 2019 | 2020 | 2021 | 2022E | 2023E |
|---------------------------|----------------|----------------|----------------|----------------|----------------|----------------|
| Share Buybacks | \$840 | \$749 | \$538 | \$919 | \$1,030 | \$1,133 |
| Capital Expenditures | 719 | 731 | 667 | 738 | 805 | 845 |
| Dividends | 483 | 514 | 520 | 548 | 605 | 660 |
| R&D | 337 | 358 | 401 | 455 | 496 | 536 |
| Cash Acquisitions | 431 | 264 | 224 | 349 | 349 | 383 |
| Total Cash Use | \$2,810 | \$2,616 | \$2,351 | \$3,009 | \$3,284 | \$3,557 |
| % year/year growth | | | | | | |
| Share Buybacks | 55 % | (11)% | (28)% | 71 % | 12 % | 10 % |
| Capital Expenditures | 15 | 2 | (9) | 11 | 9 | 5 |
| Dividends | 7 | 6 | 1 | 5 | 10 | 9 |
| R&D | 11 | 6 | 12 | 13 | 9 | 8 |
| Cash Acquisitions | 34 | (39) | (15) | 56 | 0 | 10 |
| Total Cash Use | 25 % | (7)% | (10)% | 28 % | 9 % | 8 % |

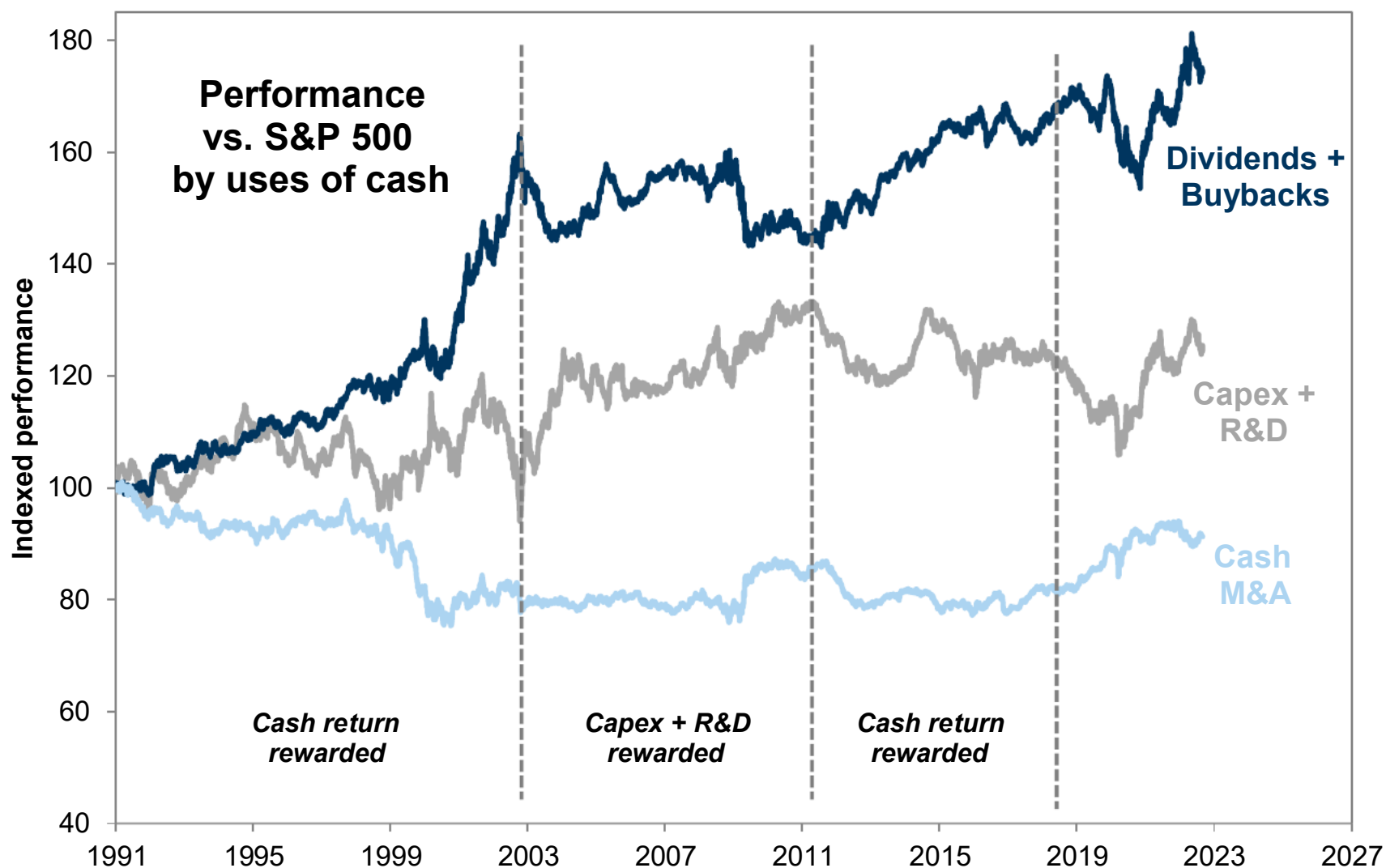
Buybacks & dividends comprise 50% of cash spend

Capex and R&D represented 36% of total spending for average firm in 2021



How investors reward various uses of cash

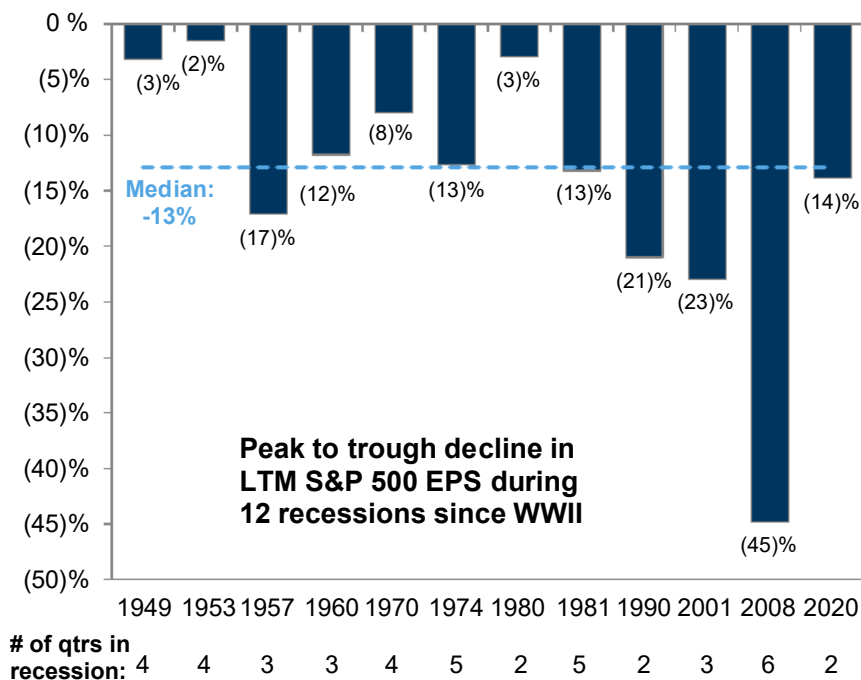
Stocks spending the most on buybacks and dividends have outperformed



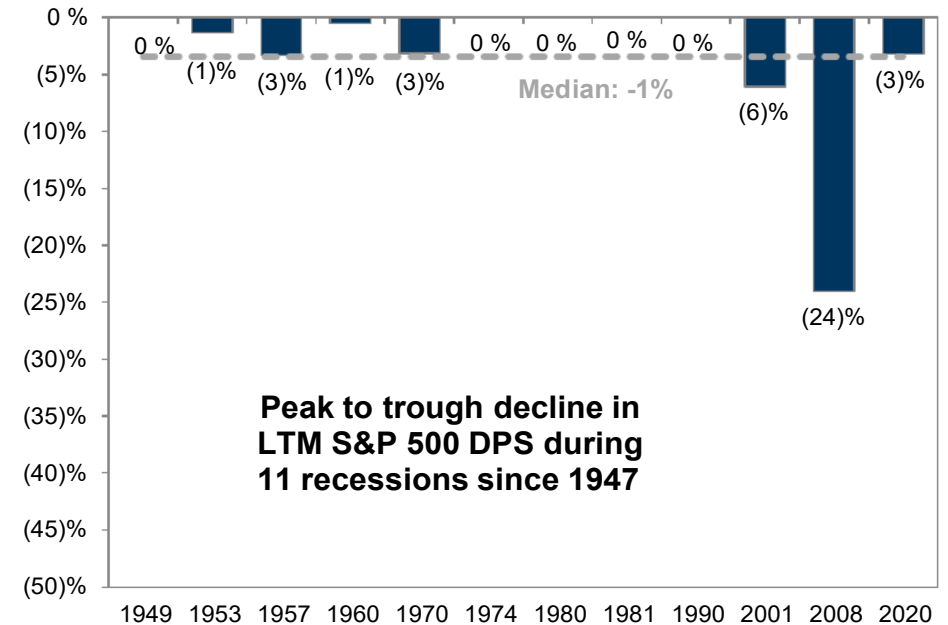
S&P 500 DPS historically fell by 1% during recessions

24% drop in 2008 recession was driven by the suspension of Bank dividends

S&P 500 EPS during recessions



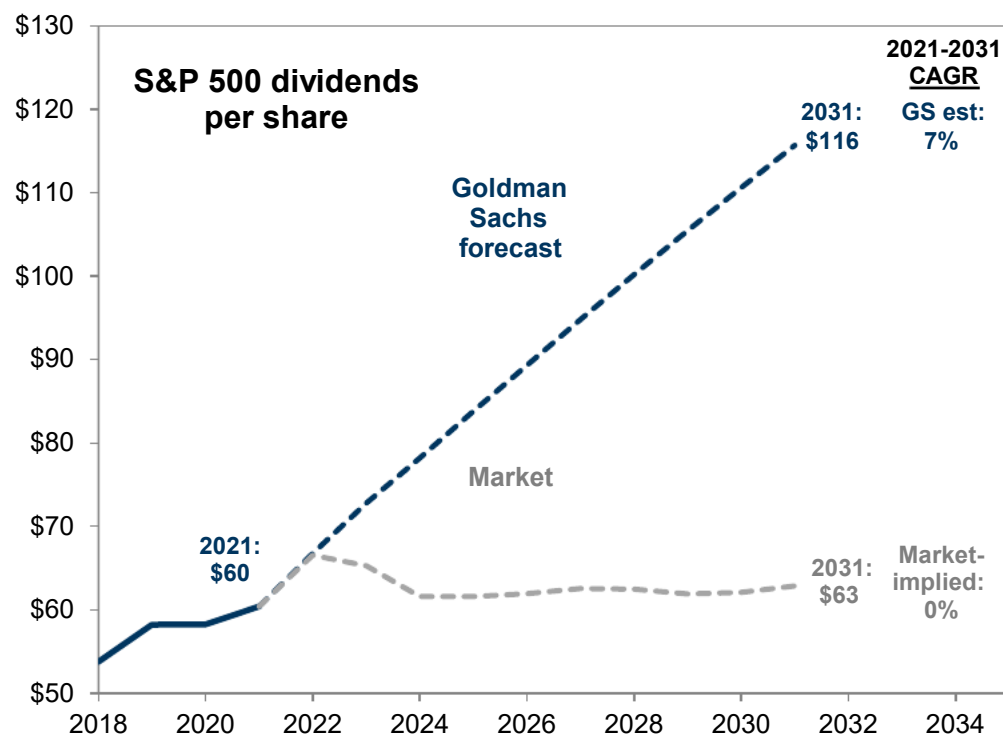
S&P 500 DPS during recessions



Investors are overly pessimistic about dividends

We forecast 10-year CAGR dividend growth of 6.7%; market implies just 0.4%

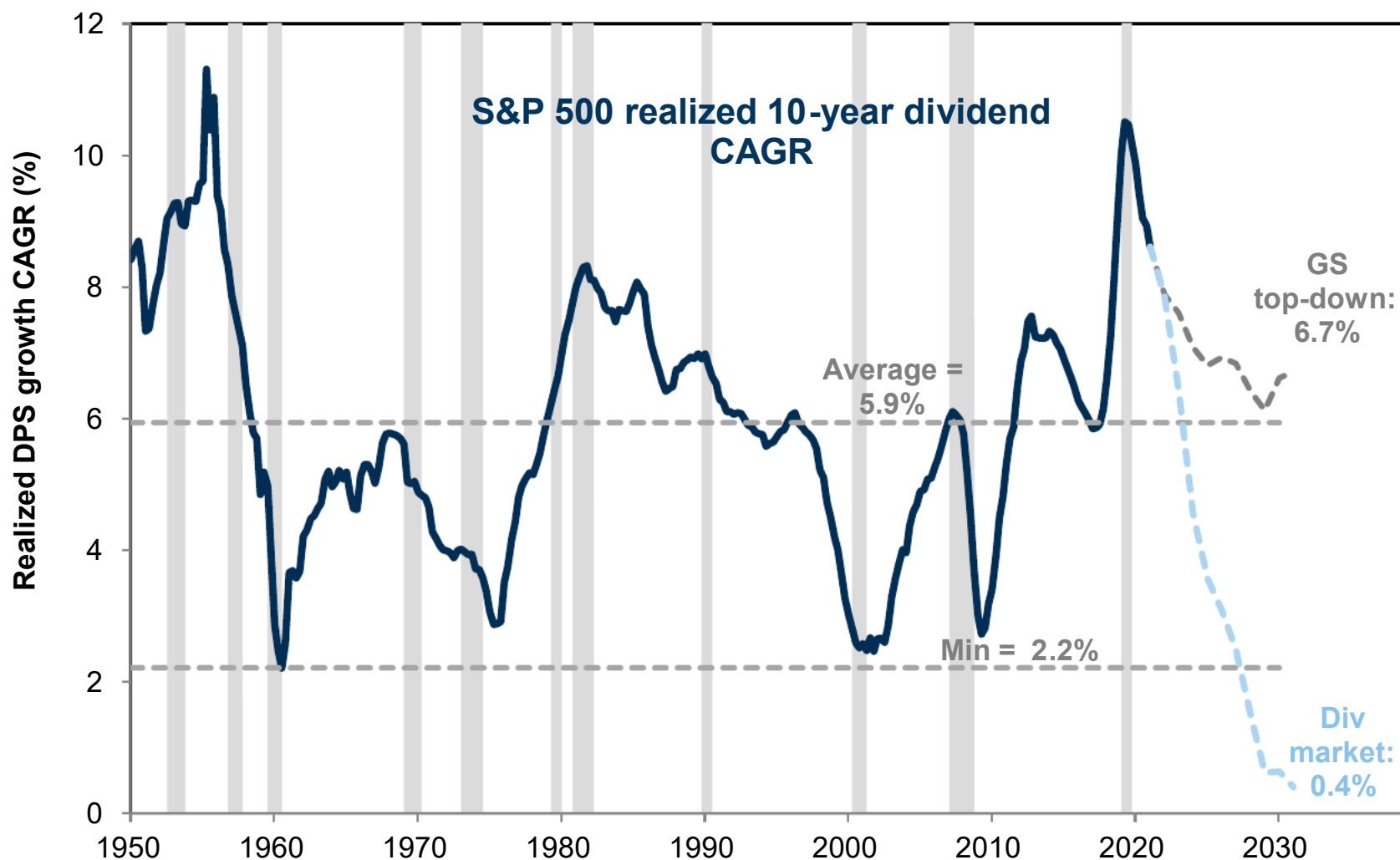
S&P 500 dividends, 2021-2031E



| | Goldman Sachs top-down forecast | | Dividend futures | | GS vs. market |
|-----------------------|------------------------------------|--------------|---------------------|--------------|------------------|
| | Level | Growth | Level | Growth | |
| 2021A | \$60.4 | 3.6 % | \$60.4 | 3.6 % | |
| 2022 | 66.7 | 10.5 | 66.6 | 10.2 | 0 % |
| 2023 | 72.8 | 9.1 | 65.3 | (1.9) | 11 |
| 2024 | 78.2 | 7.4 | 61.6 | (5.7) | 27 |
| 2025 | 83.8 | 7.2 | 61.6 | 0.0 | 36 |
| 2026 | 89.3 | 6.6 | 62.0 | 0.6 | 44 |
| 2027 | 94.8 | 6.1 | 62.6 | 1.0 | 52 |
| 2028 | 100.2 | 5.7 | 62.5 | (0.1) | 60 |
| 2029 | 105.5 | 5.3 | 61.9 | (1.0) | 70 |
| 2030 | 110.6 | 4.9 | 62.1 | 0.3 | 78 |
| 2031 | 115.7 | 4.6 | 62.9 | 1.2 | 84 |
| 2021-2031 CAGR | | 6.7 % | | 0.4 % | |

10-year DPS growth has never realized below 2%

Since 1950, 10-year S&P 500 Dividend per share CAGR has averaged 6%



Dividend Yield & Growth basket (GSTHDIVG)

Higher yield (3.4% vs 1.8%), faster growth (11% vs 6%), lower P/E (11x vs 17x)

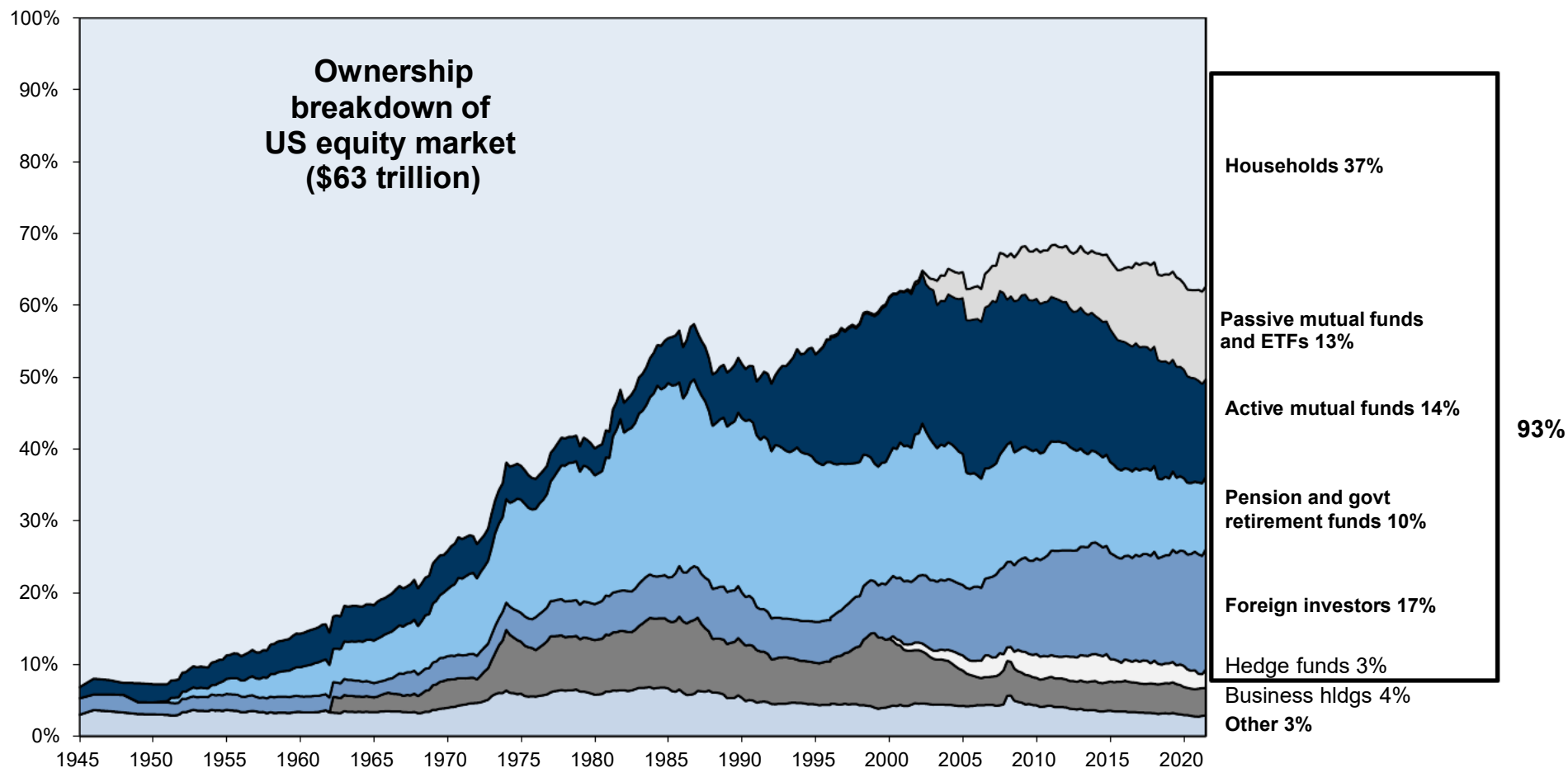
| Company | Ticker | Equity cap (\$ bil) | YTD Return | NTM P/E | Payout Ratio | 2022E Dividend Yield | 2021-2023 Dividend CAGR | 2023E DPS/ current price |
|-------------------------------|--------|---------------------|------------|---------|--------------|----------------------|-------------------------|--------------------------|
| COMMUNICATION SERVICES | | | | | | | | |
| Lumen Technologies | LUMN | \$12 | (6)% | 8 x | 73 % | 8.9 % | 0 % | 8.9 % |
| Verizon Communications | VZ | 212 | (1) | 9 | 47 | 5.1 | 2 | 5.2 |
| Omnicom Group Inc. | OMC | 13 | (11) | 10 | 43 | 4.5 | 4 | 4.7 |
| Interpublic Grp of Cos. | IPG | 11 | (25) | 10 | 43 | 4.2 | 7 | 4.5 |
| Comcast Corp. | CMCSA | 175 | (21) | 11 | 30 | 2.7 | 8 | 2.9 |
| CONSUMER DISCRETIONARY | | | | | | | | |
| Best Buy Inc. | BBY | \$15 | (31)% | 8 x | 39 % | 5.1 % | 20 % | 5.9 % |
| Whirlpool Corp. | WHR | 9 | (30) | 6 | 28 | 4.3 | 24 | 5.2 |
| Darden Restaurants | DRI | 14 | (22) | 15 | 58 | 4.0 | 19 | 4.3 |
| Tapestry Inc. | TPR | 8 | (20) | 9 | 26 | 3.1 | 55 | 3.7 |
| Advance Auto Parts | AAP | 11 | (24) | 13 | 42 | 3.4 | 38 | 3.5 |
| Ford Motor Co. | F | 47 | (42) | 6 | 20 | 3.4 | 100 | 3.4 |
| CONSUMER STAPLES | | | | | | | | |
| Conagra Brands Inc. | CAG | \$16 | 1 % | 14 x | 50 % | 3.8 % | 7 % | 4.0 % |
| Molson Coors Beverage | TAP | 12 | 22 | 14 | 38 | 2.9 | 57 | 3.0 |
| PepsiCo Inc. | PEP | 227 | (4) | 24 | 68 | 2.8 | 7 | 2.9 |
| ENERGY | | | | | | | | |
| Pioneer Natural Resources | PXD | \$57 | 35 % | 7 x | 53 % | 11.5 % | 108 % | 12.5 % |
| Devon Energy Corp. | DVN | 39 | 40 | 6 | 37 | 9.0 | 84 | 11.3 |
| FINANCIALS | | | | | | | | |
| Huntington Bancshares | HBAN | \$18 | (18)% | 8 x | 43 % | 5.2 % | 7 % | 5.6 % |
| Invesco Ltd. | IVZ | 8 | (24) | 7 | 30 | 4.3 | 9 | 4.6 |
| T. Rowe Price Group | TROW | 27 | (39) | 12 | 47 | 4.1 | 11 | 4.5 |
| Morgan Stanley | MS | 137 | (19) | 10 | 37 | 3.7 | 21 | 4.0 |
| Regions Financial | RF | 18 | (9) | 9 | 30 | 3.7 | 9 | 4.0 |
| JPMorgan Chase | JPM | 340 | (26) | 10 | 33 | 3.5 | 10 | 3.9 |
| HEALTH CARE | | | | | | | | |
| Gilead Sciences | GILD | \$78 | (12)% | 10 x | 48 % | 4.7 % | 4 % | 5.0 % |
| Viatis Inc. | VTRS | 13 | (18) | 3 | 14 | 4.4 | 26 | 4.8 |
| AbbVie Inc. | ABBV | 269 | 15 | 11 | 40 | 3.7 | 8 | 4.0 |
| Organon & Co. | OGN | 9 | 16 | 7 | 22 | 3.3 | 45 | 3.4 |
| Amgen Inc. | AMGN | 130 | 10 | 14 | 44 | 3.2 | 8 | 3.4 |
| Merck & Co. Inc. | MRK | 232 | 22 | 13 | 40 | 3.1 | 8 | 3.3 |
| Bristol-Myers Squibb | BMJ | 168 | 28 | 10 | 28 | 2.1 | 7 | 2.9 |

| Company | Ticker | Equity cap (\$ bil) | YTD Return | NTM P/E | Payout Ratio | 2022E Dividend Yield | 2021-2023 Dividend CAGR | 2023E DPS/ current price |
|--|--------|---------------------|------------|---------|--------------|----------------------|-------------------------|--------------------------|
| INDUSTRIALS | | | | | | | | |
| Johnson Controls Intl | JCI | \$34 | (40)% | 15 x | 43 % | 3.2 % | 23 % | 3.6 % |
| United Parcel Service | UPS | 132 | (15) | 14 | 48 | 3.4 | 25 | 3.6 |
| Snap-on Inc. | SNA | 11 | (5) | 13 | 36 | 2.9 | 14 | 3.3 |
| Fastenal Co. | FAST | 28 | (22) | 26 | 64 | 2.5 | 12 | 2.8 |
| INFORMATION TECHNOLOGY | | | | | | | | |
| International Bus. Machines | IBM | \$128 | 9 % | 14 x | 65 % | 4.6 % | 1 % | 4.7 % |
| Seagate Tech Holdings | STX | 16 | (34) | 8 | 30 | 3.9 | 4 | 4.0 |
| Intel Corp. | INTC | 154 | (25) | 11 | 42 | 3.9 | 5 | 4.0 |
| Broadcom Inc. | AVGO | 204 | (24) | 13 | 42 | 3.4 | 11 | 3.7 |
| Corning Inc. | GLW | 27 | (11) | 14 | 45 | 3.3 | 10 | 3.6 |
| Texas Instruments | TXN | 142 | (17) | 18 | 54 | 3.1 | 12 | 3.4 |
| HP Inc. | HPQ | 36 | (7) | 8 | 24 | 3.0 | 17 | 3.3 |
| NXP Semiconductors | NXPI | 40 | (32) | 11 | 24 | 2.2 | 41 | 2.9 |
| Paychex Inc. | PAYX | 43 | (11) | 30 | 80 | 2.5 | 13 | 2.8 |
| Skyworks Solutions | SWKS | 15 | (37) | 8 | 19 | 2.5 | 10 | 2.7 |
| Microchip Technology | MCHP | 33 | (31) | 11 | 20 | 1.9 | 31 | 2.5 |
| Analog Devices Inc. | ADI | 78 | (15) | 15 | 31 | 2.0 | 11 | 2.3 |
| Fidelity National Info Svc. | FIS | 58 | (13) | 13 | 25 | 2.0 | 14 | 2.2 |
| Automatic Data Processing | ADP | 89 | (12) | 29 | 55 | 2.0 | 9 | 2.1 |
| MATERIALS | | | | | | | | |
| Packaging of America | PKG | \$13 | 4 % | 12 x | 43 % | 3.4 % | 13 % | 3.7 % |
| REAL ESTATE | | | | | | | | |
| Simon Property Group | SPG | \$33 | (36)% | 8 x | 57 % | 6.9 % | 11 % | 7.3 % |
| UTILITIES | | | | | | | | |
| NRG Energy Inc. | NRG | \$9 | (11)% | 4 x | 14 % | 3.7 % | 7 % | 4.0 % |
| Dividend Growth <GSTHDIVG> Median | | | | | | | | |
| | | \$33 | (15)% | 11 x | 41 % | 3.4 % | 11 % | 3.7 % |
| S&P 500 Median | | | | | | | | |
| | | 28 | (18) | 17 | 26 | 1.8 | 6 | 2.1 |

Demand for equities

Ownership of US equity market since 1945

Households, mutual funds, pensions, and foreign investors own 93% of market



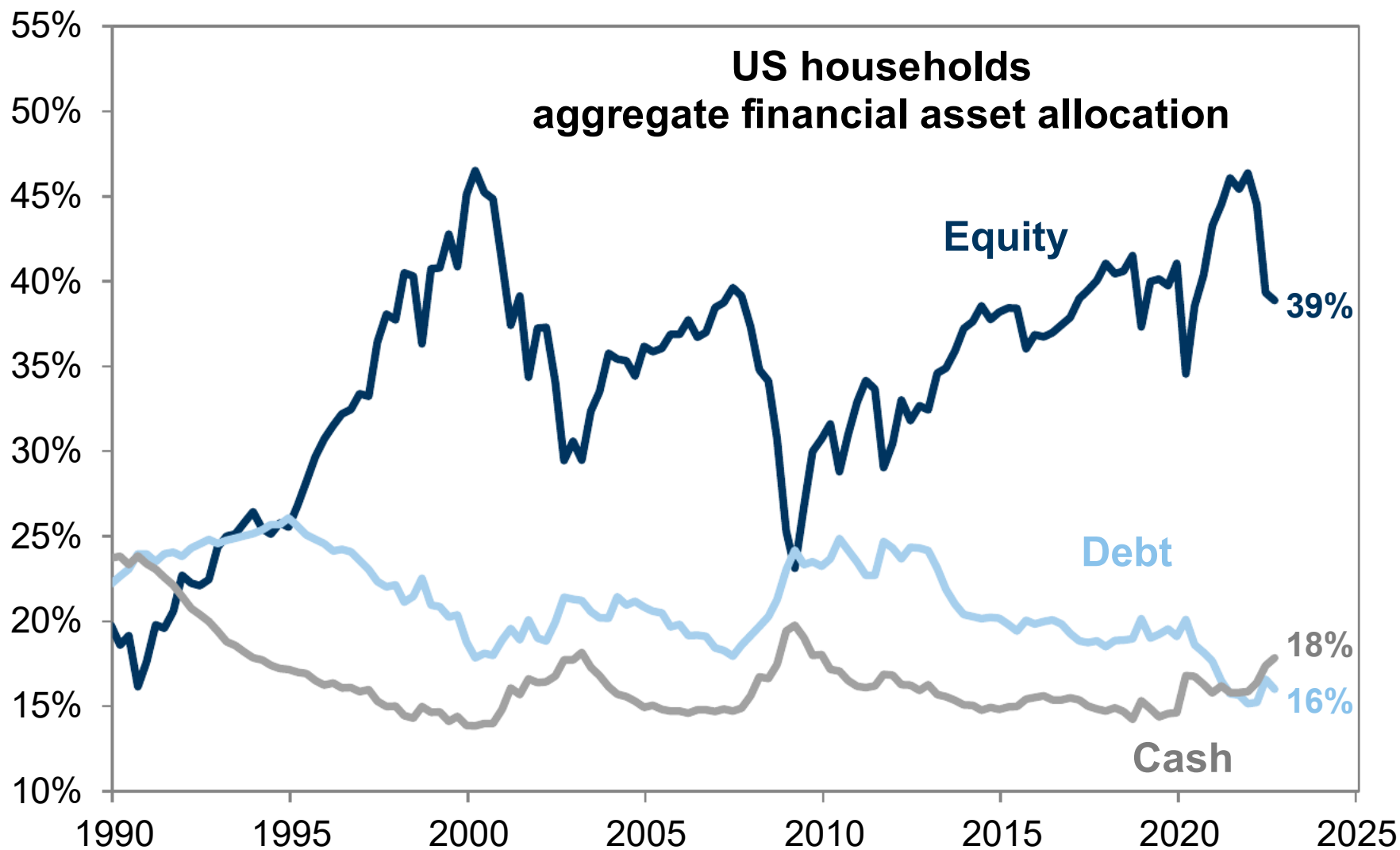
Corporations will be key source of US equity demand

Buybacks had been largest source of equity demand for last 10 years until 2020

| Category | Net US equity demand (\$ billions) | | | | |
|-----------------------------|------------------------------------|--------|--------|--------|--------|
| | 2020 | 2021 | 1H22 | 2022E | 2023E |
| Corporations | \$ 32 | \$ 623 | \$ 398 | \$ 700 | \$ 500 |
| Households | 566 | 448 | 155 | 100 | (100) |
| Foreign Investors | 669 | (45) | 16 | 100 | (100) |
| Pension Funds | (150) | (223) | (55) | (100) | 200 |
| Mutual Funds | (481) | (317) | (170) | (350) | (300) |
| Life Insurance | 1 | (80) | (17) | - | - |
| Other | (1) | (49) | 19 | - | - |
| <i>less</i> | | | | | |
| Credit ETFs | 241 | 203 | 86 | 150 | - |
| Purchases of foreign stocks | 396 | 155 | 265 | 300 | 200 |

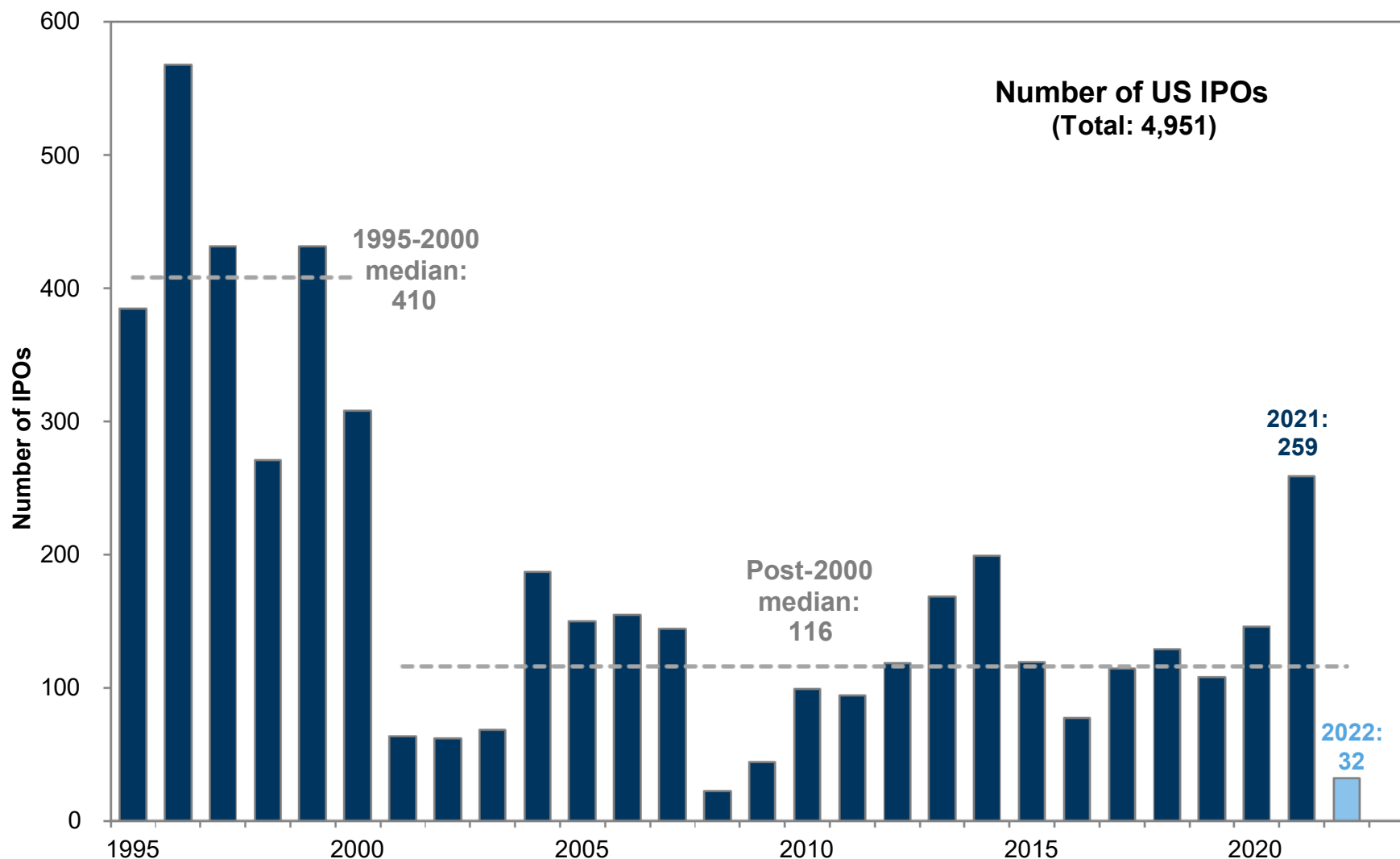
Equity allocations have fallen from recent peak

Investors allocated 39% of financial assets to equities down from 47% in 2021



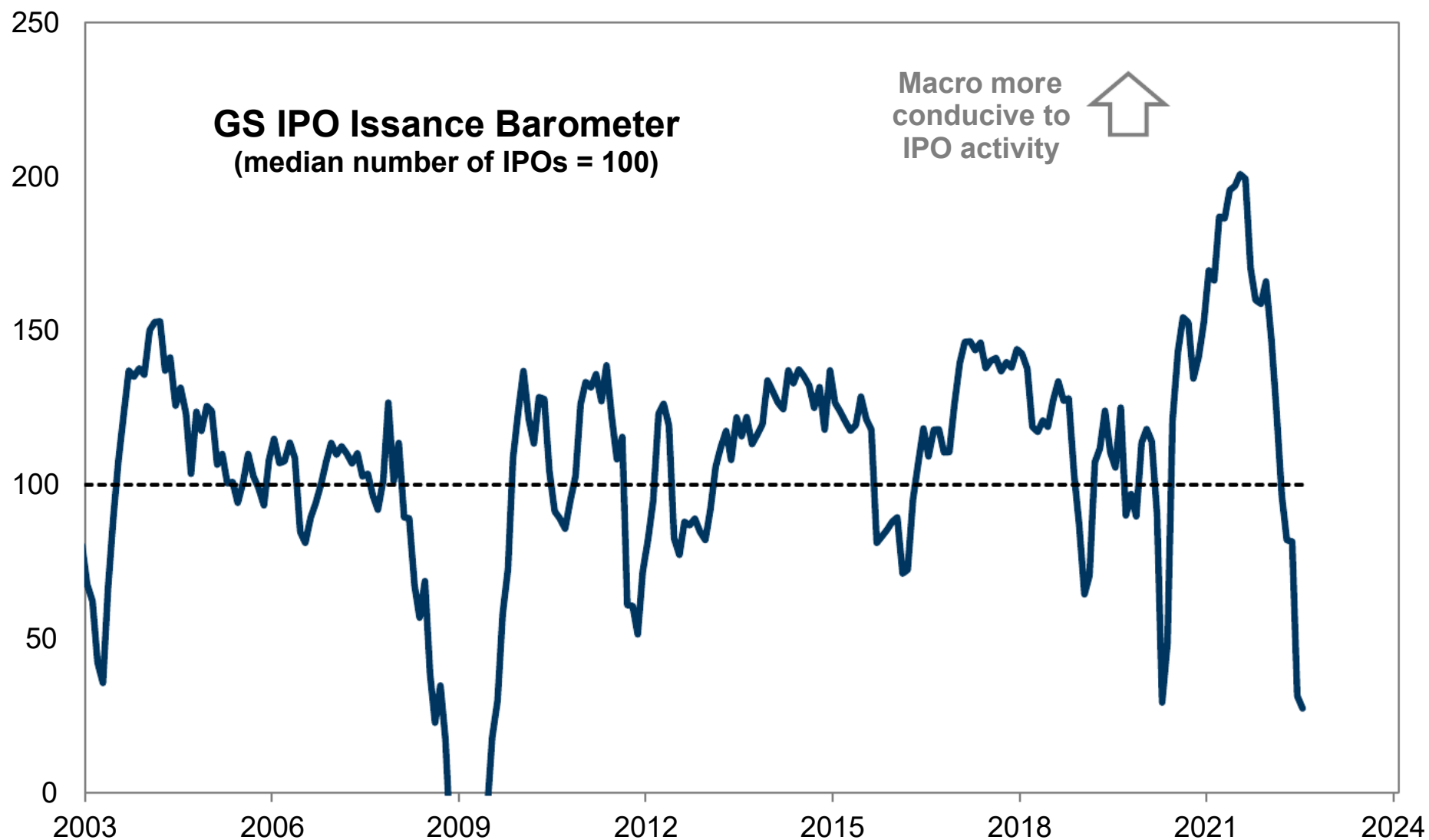
The number of IPOs has plummeted in 2022

Fewer IPOs have been completed this year than in any of the last 25, ex. 2008



Goldman Sachs IPO issuance barometer

GS IPO Issuance Barometer consistent with weak IPO activity



Components of GS IPO Issuance Barometer

Barometer incorporates 5 indicators and is updated on a monthly frequency

| GS IPO Issuance Barometer | | | |
|----------------------------------|---|-----------|--------------------------|
| Indicator | 1 std. dev. change in IPO activity from 1 std. dev. increase in variable | Current | Percentile rank since |
| | | | 2003 |
| S&P 500 drawdown | 1.54 | (21)% | 9 % |
| CEO Confidence | 0.85 | 39 | 4 |
| Change in 2-year UST yield | -0.63 | 2.0 pp | 1 |
| S&P 500 EV/sales | 0.56 | 2.6 x | 90 |
| ISM Manufacturing Index | 0.43 | 53 | 40 |
| GS IPO Issuance Barometer | | 25 | 5 % |

Global

Sector decomposition of global equity indices

All-Country World dominated by Tech (21%), Financials (14%), Healthcare (13%)

| GICS sector | AC World | US | Europe | APxJ | Japan |
|-------------------------|---------------------|---------------|---------------|--------------|--------------|
| Info Tech | 21 % | 27 % | 7 % | 18 % | 13 % |
| Financials | 14 | 11 | 16 | 22 | 10 |
| Health Care | 13 | 15 | 17 | 5 | 9 |
| Cons Disc | 11 | 11 | 10 | 14 | 18 |
| Industrials | 9 | 8 | 14 | 6 | 24 |
| Comm Services | 8 | 9 | 4 | 9 | 9 |
| Cons Staples | 8 | 7 | 14 | 5 | 7 |
| Materials | 5 | 3 | 7 | 8 | 6 |
| Energy | 5 | 4 | 6 | 4 | 1 |
| Utilities | 3 | 3 | 4 | 3 | 1 |
| Real Estate | 3 | 3 | 1 | 4 | 2 |
| Total | 100 % | 100 % | 100 % | 100 % | 100 % |
| Market cap (tn) | \$55.7 | \$34.0 | \$8.4 | \$6.9 | \$2.9 |
| Percent of World | 100 % | 61 % | 15 % | 12 % | 5 % |

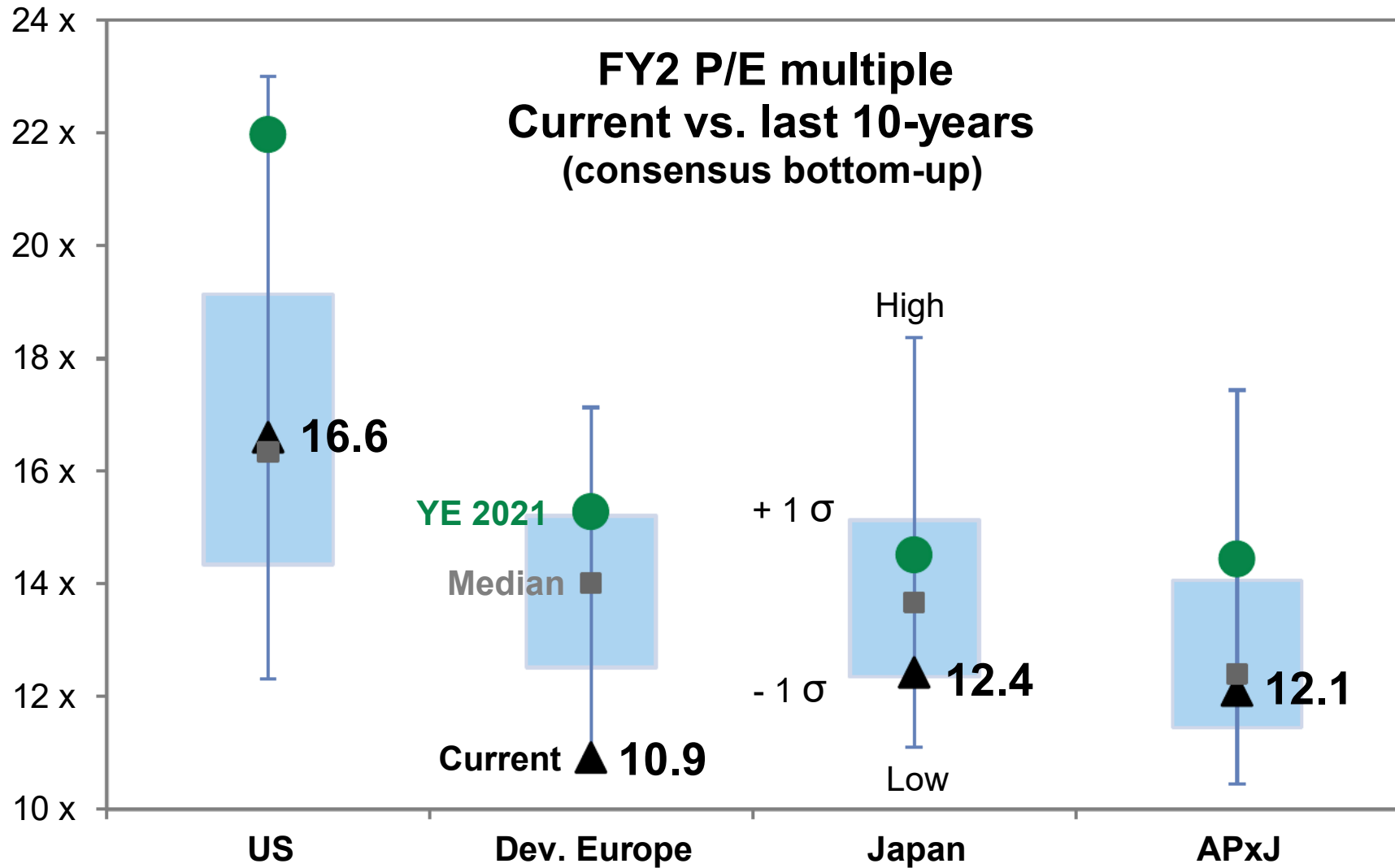
Global equity market returns, valuation, and growth

Total return potential through year-end 2022: Asia and US

| INDEX | | | EARNINGS | | VALUATION | | | RETURN | |
|---------------------|-------------|-------------------|----------|------|------------------------------|---------------------------------------|--------------|--------------|-------|
| | Index level | | Adjusted | | Forward P/E (GS) | | Div Yield | Forecast | |
| | Current | YE 2022 target | | | Current Price/ NTM EPS | YE 2022 price target/ 2023E EPS | | total return | |
| | | | | 2022 | 2023 | | | | Local |
| MXAPJ | 453 | 460 | 5 % | 5 % | 10.6 x | 10.1 x | 3.5 % | 5 % | 5 % |
| TOPIX | 1836 | 1900 | 10 | 3 | 11.8 | 12.0 | 2.8 | 5 | 12 |
| S&P 500 | 3586 | 3600 | 8 | 3 | 15.6 | 15.4 | 1.9 | 1 | 1 |
| STOXX Europe 600 | 388 | 360 | 17 | (10) | 11.5 | 11.3 | 4.0 | (5) | (6) |

Global equity market valuation vs. history

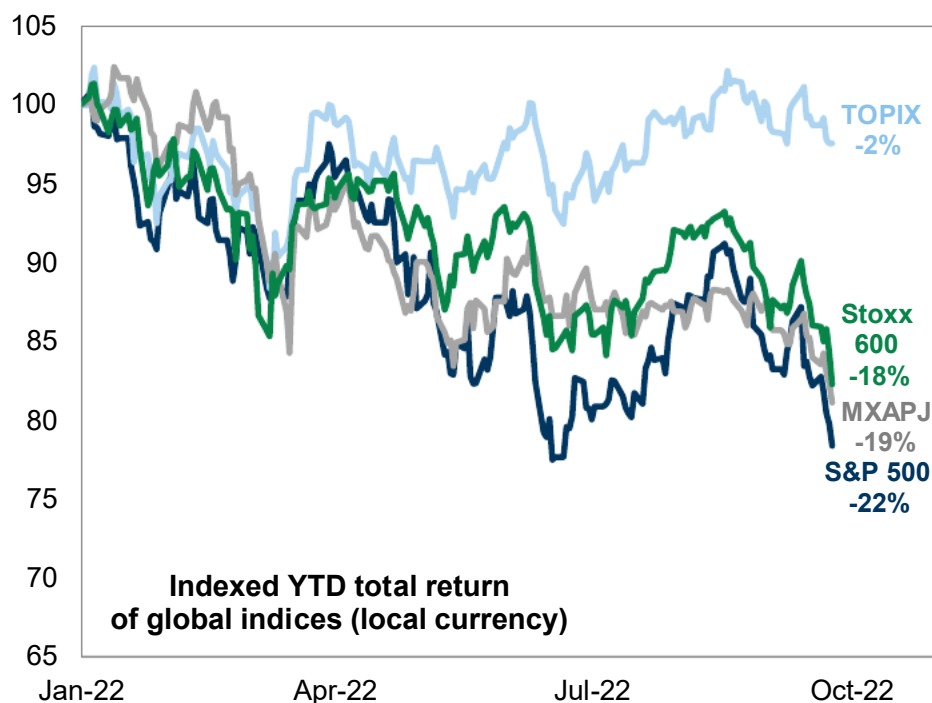
Stock markets currently trade at or below median historical valuations



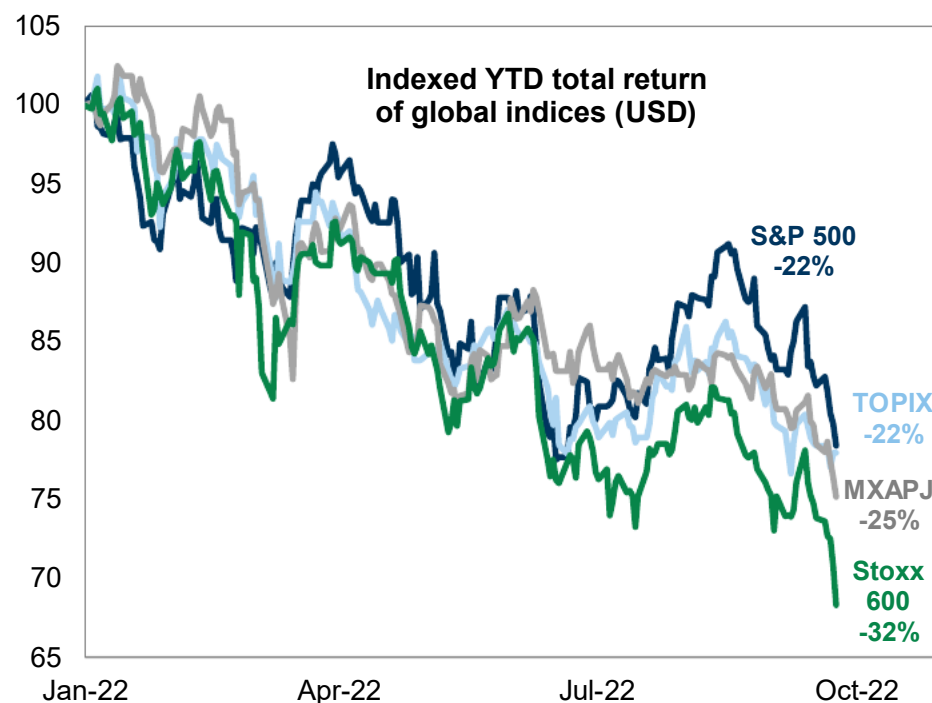
Return of global indices in USD and local currency

S&P 500 is best-performing index on USD basis, TOPIX on local currency basis

Indexed return in local currency



Indexed return in USD



Goldman Sachs global macro forecasts

Equities, rates, credit, currencies, and commodities

| | units | Current | 3m | 6m | 12m | Change to Target |
|------------------------|--------------|-------------|-------------|-------------|-------------|------------------|
| Equities | | | | | | |
| MXAPJ | level | 453 | 460 | 480 | 515 | 14 % |
| TOPIX | level | 1869 | 1900 | 2020 | 2100 | 12 |
| S&P 500 | level | 3640 | 3600 | 3600 | 4000 | 10 |
| STOXX Europe 600 | level | 383 | 360 | 380 | 410 | 7 |
| Ten Year Rates | | | | | | |
| Japan | % | 0.2 | 0.3 | 0.3 | 0.5 | 25 bp |
| US | % | 3.8 | 3.8 | 3.9 | 4.0 | 20 |
| Euro Area (Germany) | % | 2.2 | 2.0 | 2.3 | 2.3 | 2 |
| Corporate Bonds | | | | | | |
| Investment grade | bp | 158 | 175 | 159 | 140 | (18)bp |
| High yield | bp | 561 | 625 | 535 | 465 | (96) |
| Currencies | | | | | | |
| Sterling / US Dollar | £/\$ | 1.10 | 1.05 | 1.08 | 1.19 | 8 % |
| Euro / US Dollar | EUR/\$ | 0.98 | 0.97 | 0.97 | 1.05 | 8 |
| US Dollar / Yen | \$/¥ | 145 | 145 | 135 | 125 | (14) |
| Commodities | | | | | | |
| WTI Crude Oil | \$/bbl | 80 | 95 | 100 | 105 | 31 % |
| Brent Crude Oil | \$/bbl | 87 | 100 | 105 | 110 | 26 |
| LME Copper | \$/mt | 7661 | 6700 | 7600 | 9000 | 17 |
| COMEX Gold | \$/troy oz | 1669 | 1850 | 1950 | 1950 | 17 |
| ICE TTF Nat. Gas | \$/mmBtu | 65 | 32 | 25 | 69 | 6 |
| NYMEX Nat. Gas | \$/mmBtu | 7 | 8.0 | 7.4 | 4.2 | (41) |

Disclosure Appendix

Reg AC

We, David J. Kostin, Ben Snider, Ryan Hammond, Cormac Connors, 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

Basket disclosures

The ability to trade the basket(s) in this report will depend upon market conditions, including liquidity and borrow constraints at the time of trade.

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. 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

Disclosure Appendix

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 résolution (“ACPR”) and regulated by the Autorité de contrôle prudentiel et de résolution and the Autorité des marchés 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 (Finansinspektionen) 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.

© 2022 Goldman Sachs.

No part of this material may be (i) copied, photocopied or duplicated in any form by any means or (ii) redistributed without the prior written consent of The Goldman Sachs Group, Inc.