Strategy Matters

Closing the Value Gap

- A number of European sectors (Banks, Energy, Basic Resources and Autos) trade on mid-single-digit P/E multiples. These valuations are at lows compared with both the market and their own history. They are also trading on heavy discounts to their US peers – more so than any other sector in Europe.
- The Value/Growth trade dominated investor conversations at the start of this year as real yields rose sharply, putting pressure on Tech and other Growth stocks. For a brief period the discount of Value stocks narrowed, though not because their valuations rose but because those for high-growth stocks collapsed.
- But that discount is back to extremes. First, recession risks and high policy uncertainty have sent investors back to 'safer' Growth Defensives. This has offset the benefit that rate rises might otherwise have had to value sectors.
- Second, Value sectors have been out-earning Growth stocks: Banks, Autos, Energy and Basic Resources have all seen double-digit positive EPS revisions YTD. The paradox is the more they earn, the more investors view this as unsustainable, leading to an even deeper discount.
- For Value to outperform, typically we need to see a larger-than-normal discount, robust economic growth, low or declining policy uncertainty and higher rates. These are not all in place: growth is weak (especially in Europe) and policy uncertainty is high. In addition, ESG flows dominate in Europe, unlike in the US, and these funds are structurally UW Value sectors.
- But we think some things are shifting. Policy uncertainty is high, but announcements on EU energy policy suggest change is coming. Higher rates are a significant gain for the Banks; Energy stocks should benefit from the lack of Energy supply and perhaps from a shift in focus to Green capex and the transition by ESG investors.
- Moreover, the payoff asymmetry looks excellent. When a sector is in the tenth percentile or below of its long-term relative valuation, it tends to outperform over 6m, 1y and 3y periods.
- We are OW Banks, Energy and Basic Resources, and Neutral on Autos. We are UW the more vulnerable Cyclicals: Construction, Chemicals and Consumer.

Sharon Bell
+44(20)7552-1341 | sharon.bell@gs.com
Goldman Sachs International

Peter Oppenheimer
+44(20)7552-5782 |
peter.oppenheimer@gs.com
Goldman Sachs International

Guillaume Jaisson
+44(20)7552-3000 |
guillaume.jaisson@gs.com
Goldman Sachs International

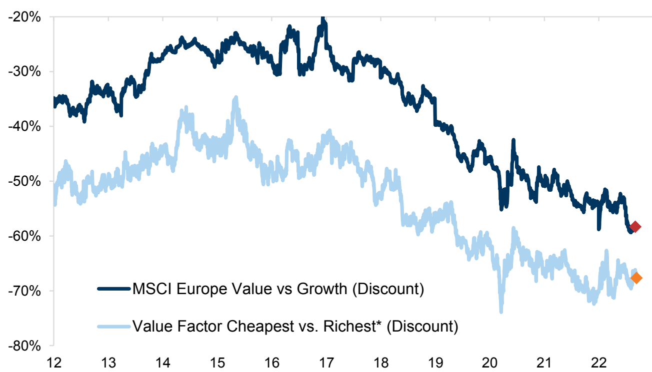
Lilia Peytavin
+44(20)7774-8340 |
lilia.peytavin@gs.com
Goldman Sachs International

Closing the Value Gap

The Value/Growth valuation gap is extreme

Given the pace and extent of interest rate rises this year, it is surprising that the discount for Value stocks relative to Growth has widened year-to-date (Exhibit 1). We can see this for a number of sectors – Autos, Banks, Basic Resources and Energy all trade on historically low relative multiples.

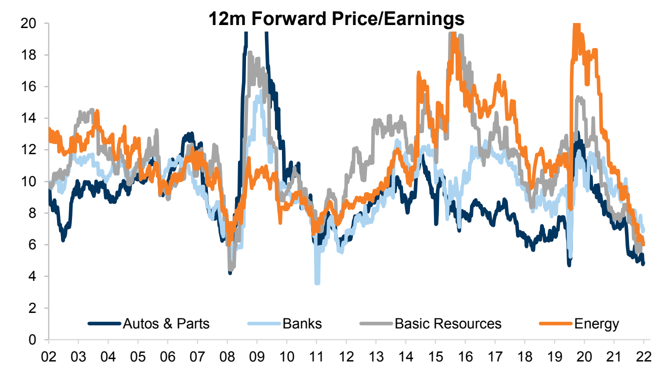
Exhibit 1: Discount for Value stocks in Europe has increased further
MSCI Europe Value vs. Growth (Discount) and Value Factor (Sector Neutral)



*All factor data is based on the GS Investment Profiling (IP) methodology. For more details, see Adjustments to GS European Investment Profiling Methodology: https://publishing.gs.com/content/research/en/reports/2022/09/12/3cc15c2a-2be4-4394-a301-9408ff212611.pdf

Source: Factset, Goldman Sachs Global Investment Research

Exhibit 2: Autos, Banks, Basic Resources and Energy all trade on historically low multiples
12m Forward Price/Earnings, European Autos & Parts, Banks, Basic Resources and Energy

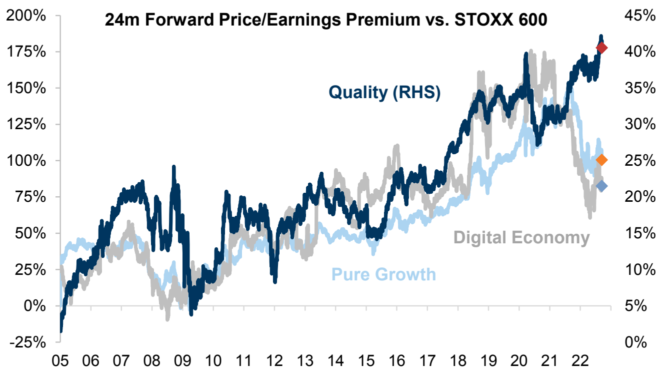


Source: Datastream, Worldscope, Goldman Sachs Global Investment Research

Partly, this is because the MSCI definitions of Growth and Value are broad – they allocate almost the entire market to these two factors. If we take a narrower view of Growth, we find some de-rating. Areas such as our Digital Economy (GSSBDIGI) or Pure Growth (GSSTGROW) baskets – selected based on the highest top-line growth – have de-rated from their high valuations in 2020 and 2021, on an absolute basis and relative to the market. That said, valuations still look stretched for these stocks versus the longer-term history. Also, more 'quality' or Defensive Growth areas continue to trade on relatively high premiums, such as our Quality basket (GSSTQUAL). This basket comprises companies with strong balance sheets, high ROE and high and stable sales growth and earnings growth. In Europe these companies make up the majority of Growth market cap (Exhibit 3).

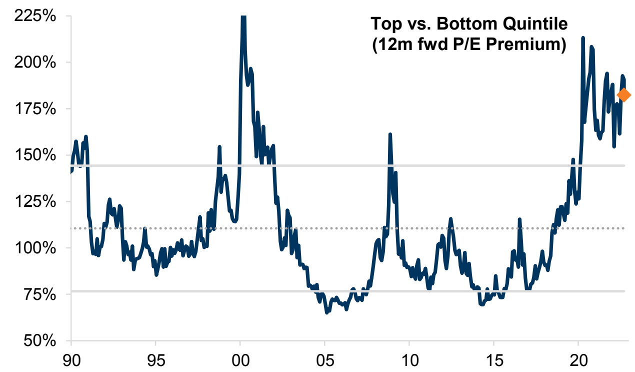
Generally the gap between the highest-valued quintile of companies and the lowest-valued has widened in recent months and remains at elevated levels (Exhibit 4).

Exhibit 3: Pure Growth companies have de-rated, but Quality/Defensives have not
Quality (GSSTQUAL), Pure Growth (GSSTGROW) and Digital Economy (GSSBDIGI)



Source: Factset, STOXX, Goldman Sachs Global Investment Research

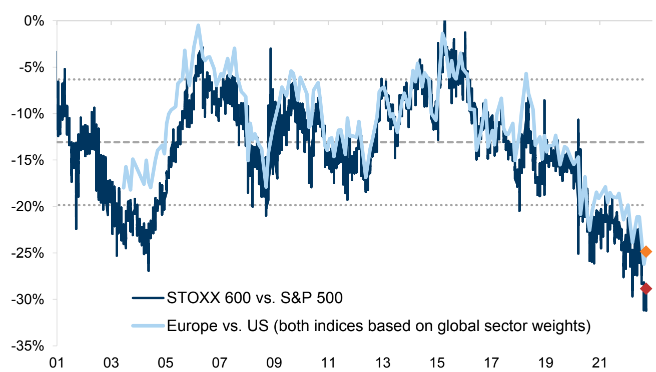
Exhibit 4: The premium for the top quintile companies (by 12m fwd P/E) remains close to all-time highs
Top vs. Bottom Quintile, Europe



Source: Datastream, STOXX, Goldman Sachs Global Investment Research

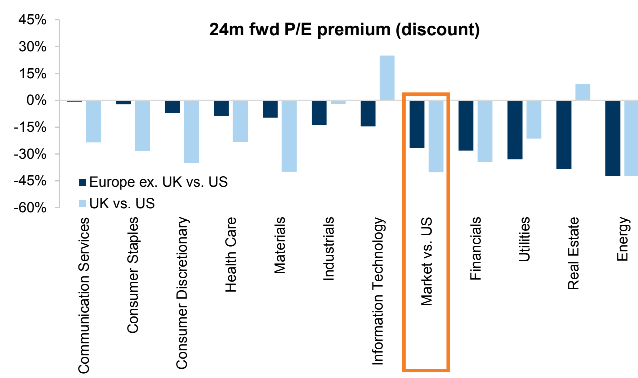
We can see this in other ways too: Europe (more of a Value market) remains on a deep discount to the US (more of a Growth market) (Exhibit 5). And this is true even adjusting for the different sector exposures of the regions (Exhibit 6).

Exhibit 5: European equities trade two standard deviations below where they typically trade vs. US equities on a P/E basis
24m forward P/E (Discount)



Source: Factset, Goldman Sachs Global Investment Research

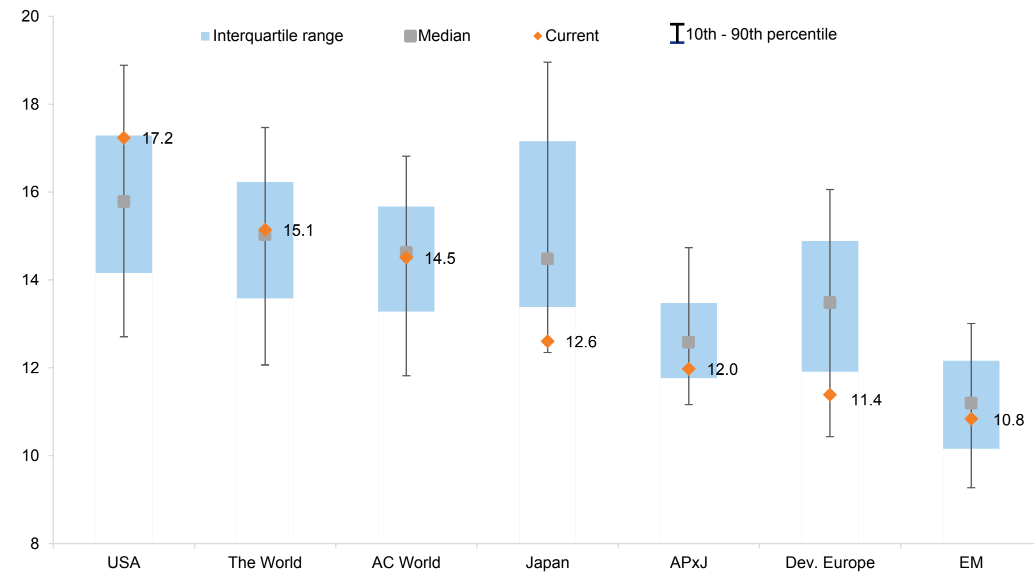
Exhibit 6: European sectors look cheap vs. US sectors
MSCI Indices, GICS Level 1 sectors



Source: Factset, Goldman Sachs Global Investment Research

It is also clear if we look by country indices across the world – the US, which has more Growth stocks, remains on a large premium to its historical average, whereas Europe is on a substantial discount.

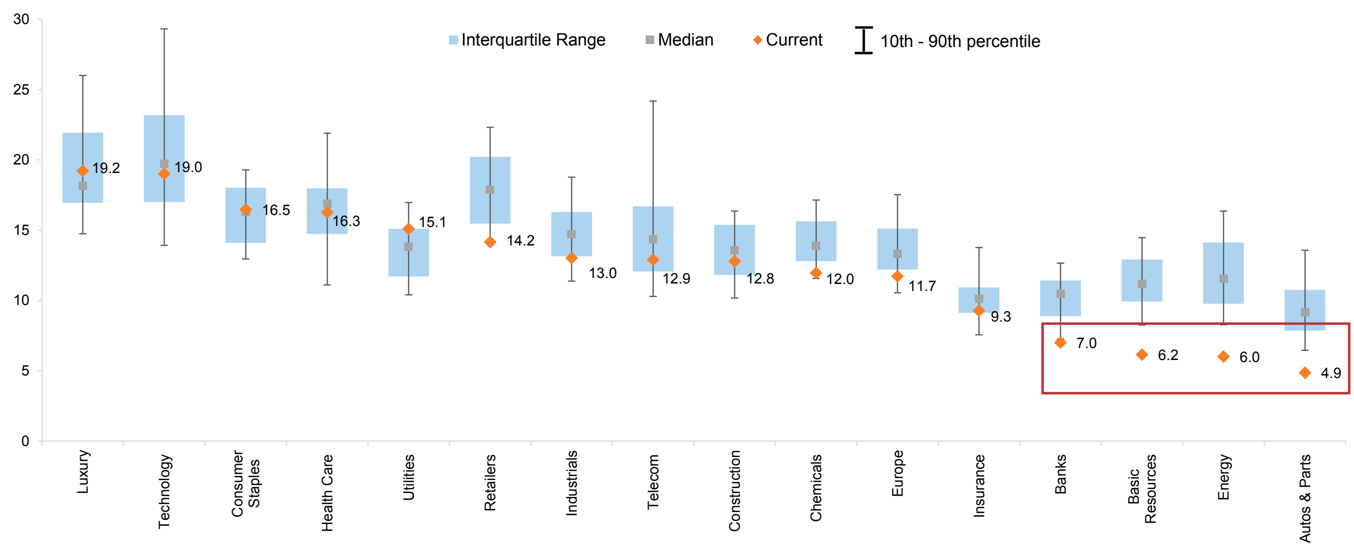
Exhibit 7: Valuation ranges (MSCI regions) over a 20-year timeline
12m fwd P/E, MSCI Regions



Source: Factset, Goldman Sachs Global Investment Research

When we look into the sectors in Europe we see the pattern even more clearly. The Value sectors trade on substantial discounts to their longer-term averages whereas the Growth sectors remain on a large premium (Exhibit 8).

Exhibit 8: Value sectors trade on substantial discounts to their longer-term averages whereas Growth sectors remain on a large premium
12m fwd P/E, Europe Worldscope Sectors since 2000



Source: Datastream, Worldscope, Goldman Sachs Global Investment Research

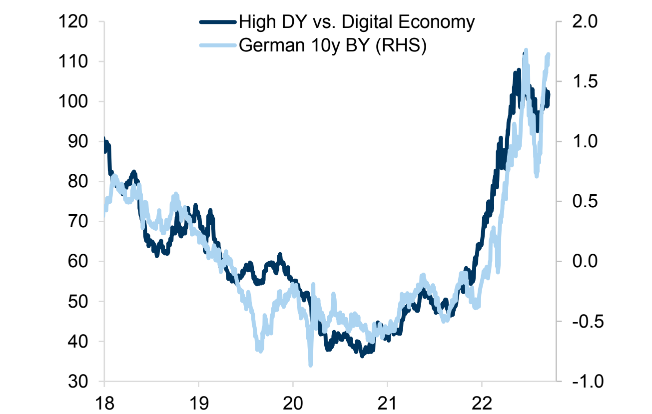
Interest rates have hit Digital and Pure Growth companies but not 'Quality'

But haven't rate rises redressed the imbalance? Not really. Higher rates hit longer-duration assets and Growth stocks disproportionately. This has been the case for most of the expensive/speculative areas of the market. But higher rates have been accompanied by unprecedented uncertainty over inflation and geopolitics, and these have increased risk aversion and pushed investors into more defensive stocks – in Europe these are largely Defensive Growth names.

Our Digital Economy basket (GSSBDIGI) – which has the highest growth expectations among our sub-sector baskets – is highly correlated to long rates. When rates are rising, Value areas of the market such as High Dividend Yield (GSSTDIVY) stocks tend to outperform high-growth areas like the Digital Economy (Exhibit 9). We continue to think that very high-growth stocks will suffer as yields rise, and our rates team expects risks to rates to remain skewed to the upside.

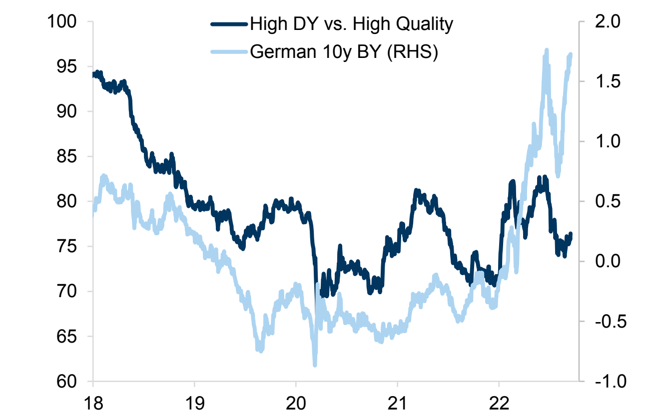
In contrast, the relationship is much less clear for Defensive Growth stocks such as our 'Quality' basket (GSSTQUAL) (Exhibit 10). Value companies outperformed versus these names when rates rose at the beginning of the year, but as economic growth is now slowing sharply Value names are no longer outperforming Quality even as rates rise (Exhibit 10). This is true for other Quality / Growth expressions such as companies with High & Stable Margins (GSSTMARG) and Strong Balance Sheets (GSSTSBAL).

Exhibit 9: Higher yields have pushed up High DY stocks versus Digital Economy names...
Relative price performance, indexed to 100 in Jan 2018. High DY (GSSTDIVY) vs. Digitial Economy (GSSBDIGI)



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

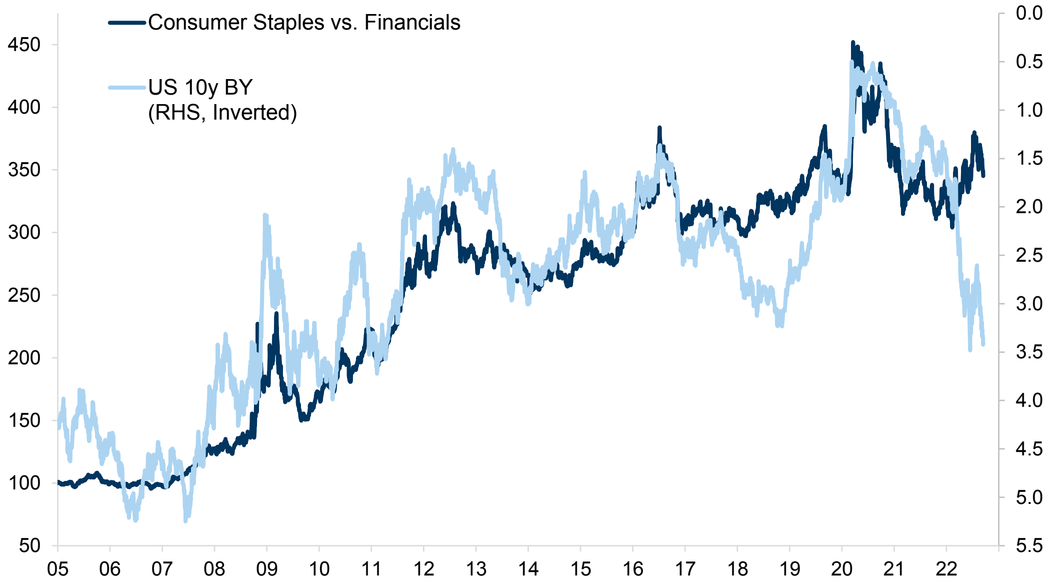
Exhibit 10: ...but this is not so clear for High DY versus Quality companies
Relative price performance, indexed to 100 in Jan 2018. High DY(GSSTDIVY) vs. High Quality(GSSTQUAL)



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

Another example is the dislocation we see between the performance of Consumer Staples and Banks relative to the moves in yields.

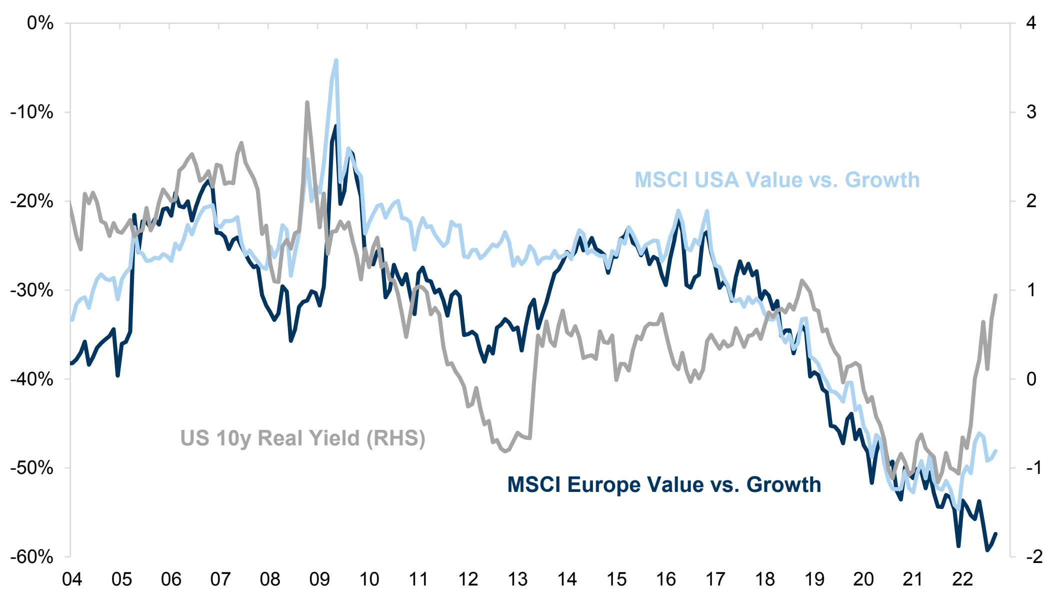
Exhibit 11: Dislocation between Consumer Staples and Financials relative to the moves in yields
Relative price perfomance, indexed to 100 in Jan 2005



Source: Datastream, Worldscope, Goldman Sachs Global Investment Research

There has been a disconnect between the rise in real yields and the valuation of Value versus Growth. Value in Europe has continued to de-rate even with the sharp rise in real yields (Exhibit 12). In contrast, in the US Value has modestly re-rated relative to Growth.

Exhibit 12: There has been a disconnect between the rise in real yields and the valuation of Value vs. Growth, especially in Europe
12m fwd P/E (Discount) and US 10y Real Yield (RHS)



Source: Datastream, Factset, Goldman Sachs Global Investment Research

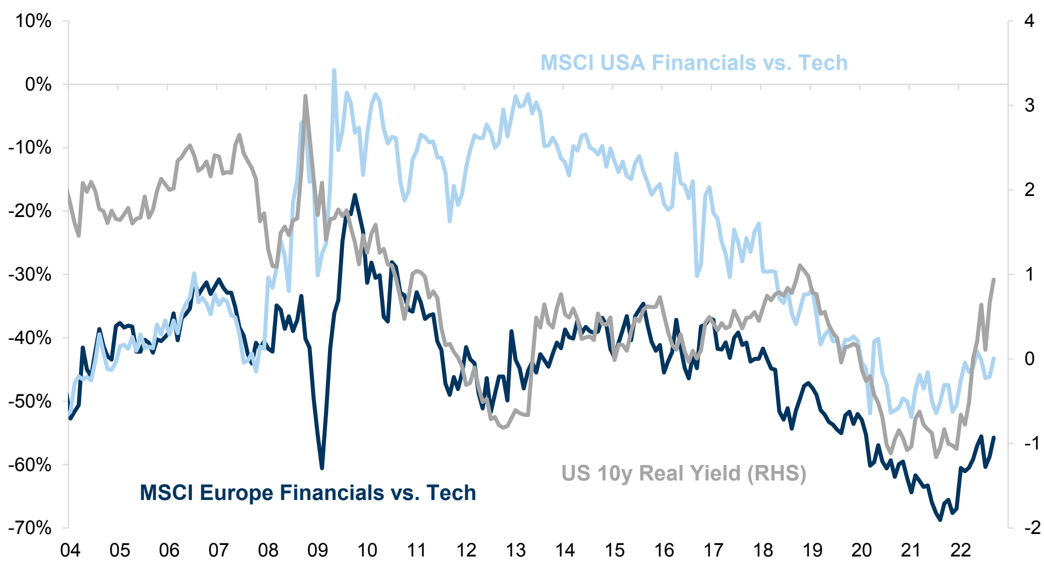
Why have Value stocks not re-rated in Europe, and can they do so?

We think there are several reasons why European Value stocks are languishing on low multiples. Investors are sceptical about their growth prospects (more than in the past), ESG funds avoid certain areas of the market, and in particular commodity stocks, which are mainly in the Value bucket. Finally, uncertainty is high at the moment. Medium-term, we expect some of these dynamics to shift in favour of Value names. Rate risks are skewed to the upside, also favouring Value stocks.

1. Some Value areas have re-rated (although we think there is more to go)

Banks relative to Technology shows a reasonably good relationship with real rates. In the medium term we expect both real and nominal rates to rise and for this to continue to support Banks. We remain OW Banks given that they should benefit from rate rises from a net interest margin perspective and because, as a Value area, rising discount rates should not harm them. We acknowledge the risks from recession in Europe in the near term, but our economists expect a mild recession and for labour markets in Europe to stay relatively strong. Our equity research analysts like UK domestic banks in particular.

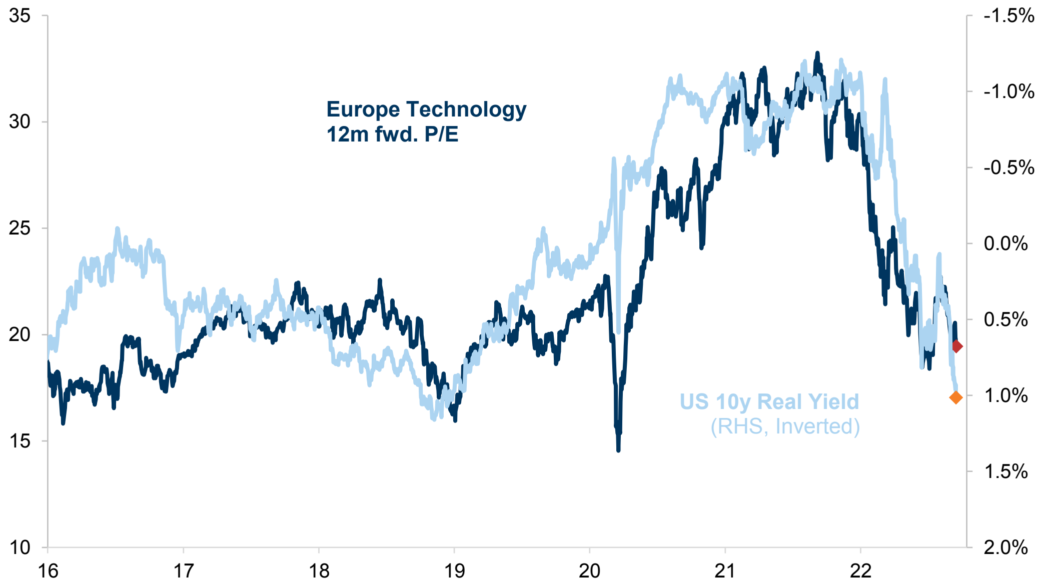
Exhibit 13: Banks relative to Technology shows a reasonably good relationship with real rates
12m fwd P/E Premium/(Discount) and US 10y Real Yield (RHS)



Source: Datastream, Factset, Goldman Sachs Global Investment Research

The Tech sector looks particularly vulnerable to rising rates, and especially US real rates. Our rates team have recently revised their yield forecasts to above the forwards, and they see most of the rise as likely to come from real yields.

Exhibit 14: Tech stock valuations in Europe remain vulnerable to rising real yields
Europe STOXX 600 Technology 12m fwd P/E and US 10y Real Yield (RHS, Inverted)



Source: FactSet, Bloomberg, Goldman Sachs Global Investment Research

2. Lack of confidence in future growth – Especially in commodity-related stocks

One of the issues is that medium-term growth expectations for the European market, and for Energy in particular, have fallen. The concern that Energy companies with vast oil assets will find these increasingly unusable as the world (and Europe in particular) switches to low-carbon alternatives is reflected in negative assumptions about future EPS growth. In addition, current earnings and cash flows benefit from high oil prices. If economies slow down, oil demand should drop and these earnings would be seen as vulnerable. The potential for higher costs and more taxation is another factor, as well as the backwardated forward curve for energy prices.

First, we would argue that this pessimism fails to take into account the need for oil during the transition to lower-carbon fuels. Second, our commodities analysts argue that the forward curve has not been a good predictor of future oil prices. Indeed, to the extent that a lower forward price for oil reduces the likelihood of oil investment, this increases the likelihood of future supply constraints.

Exhibit 15: The market is pessimistic about the medium-term growth prospects for commodity sectors
FY3 EPS growth, STOXX 600 Energy and STOXX 600 Basic resources

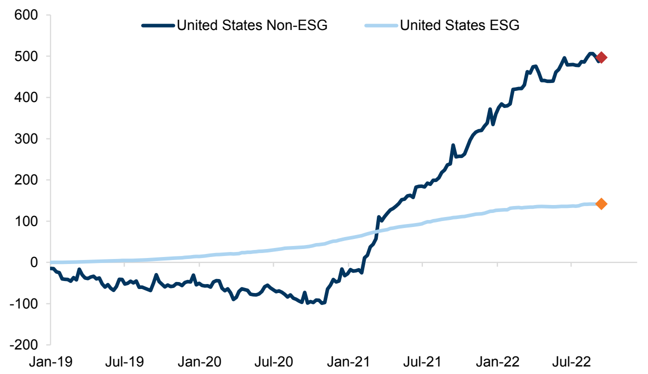
Source: Datastream, Goldman Sachs Global Investment Research

3. ESG fund flows dominate in Europe but not in the US, creating distortions to Europe's pricing

The difference between Europe and the US could not be more stark. The US has seen sustained incremental inflows into ESG funds – although these have definitely slowed this year. But for the US market there are also vast flows into non-ESG or sustainable funds. In addition, the biggest buyer of the US market is often the corporates themselves via buybacks. In Europe, ALL net flows are into ESG or socially responsible funds (Exhibit 16). ESG funds are typically very underweight Energy and Basic Resources given the industries' poor environmental scores.

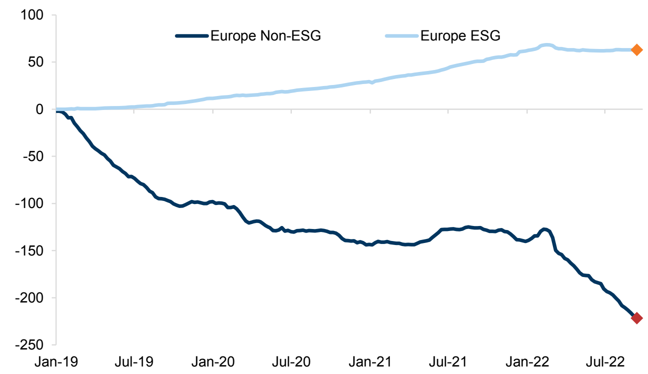
Of course, this itself could change; as our GS Sustain team notes, the EU Taxonomy is ramping up to become the 'common green standard' used to establish credibility for companies' green revenue and capex, and investors' green investments. Early reporting of aligned capex highlights the opportunity for forward-looking signals the Taxonomy can provide for companies in transition, especially where initial aligned revenue is low. This will be especially important for the Energy sector where capex dedicated to green investments is growing fast.

Exhibit 16: In the US ESG flows have risen, but they are not the dominant dollar of flows
Cumulative net flows in USD bn



Source: EPFR, Goldman Sachs Global Investment Research

Exhibit 17: In Europe flows into non-ESG funds have been sharply negative, so ESG is the 'only buyer out there'
Cumulative net flows in USD bn



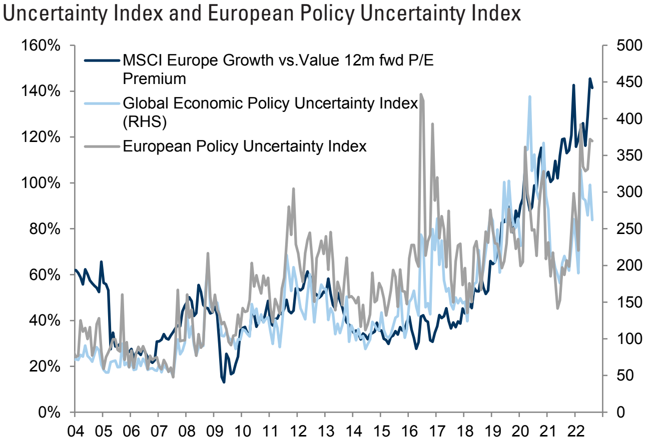
Source: EPFR, Goldman Sachs Global Investment Research

4. Policy uncertainty and volatility militate against Value stocks, but ultimately these will recede

Another factor is that uncertainty is high: (i) index volatility has risen; (ii) we expect a recession in Europe, with risks skewed to the downside; (iii) inflation is high, creating monetary policy uncertainty and large shifts in rate markets; (iv) sovereign risks persist in Europe, and are arguably worse with government debt having risen, and, finally, (v) geopolitical risks are heightened. Uncertainty tends to lead to lower valuations for the overall market and a large premium for more defensive assets. Growth companies typically have a higher premium when uncertainty rises (Exhibit 18).

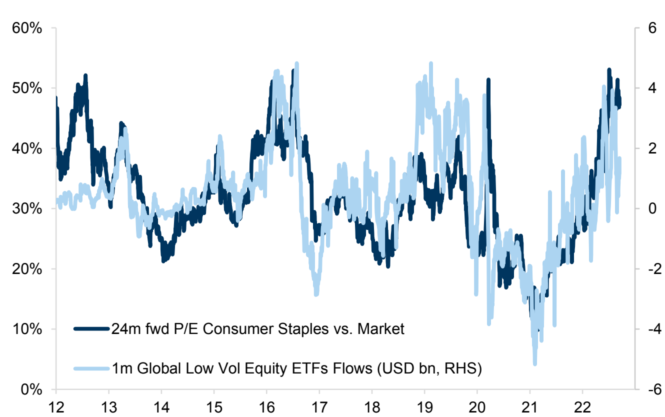
In addition, we have seen funds flowing back into low vol ETFs, which tends to be associated with outperformance of defensive sectors such as Consumer Staples (Exhibit 19).

Exhibit 18: Growth companies typically receive a higher premium when uncertainty rises
MSCI Europe Growth vs. Value (12m fwd P/E), Global Economic Policy Uncertainty Index and European Policy Uncertainty Index



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

Exhibit 19: Funds are flowing back into low vol ETFs
24m fwd P/E Cons. Staples vs. Market and 1m Global Low Vol Equity ETF flows (USDbn)



Source: Factset, EPFR, Goldman Sachs Global Investment Research

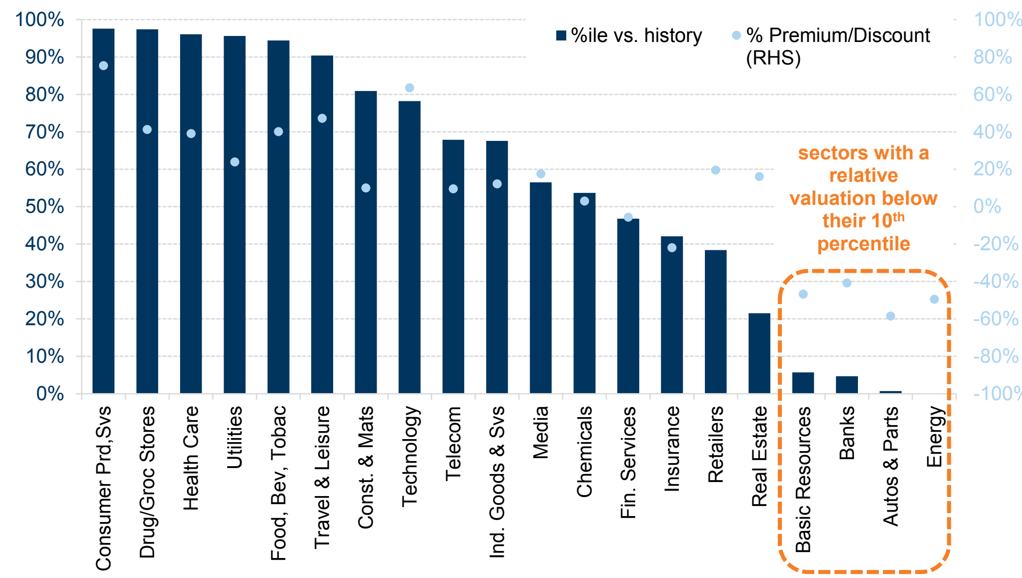
Can things turn? The payoff asymmetry looks excellent

From here, we think uncertainty could start to fade – although policy uncertainty is high, recent announcements on EU energy policy and price caps suggest changes are coming. Our economists expect inflation to peak in late autumn, and the price caps should help to ensure this. To some extent, the higher energy prices over the summer brought forward some of the price rises in order for Germany to store enough gas for the winter months.

On balance, we think the market is too pessimistic about the growth prospects for a number of Value sectors, and for Banks, Energy, and Basic Resources in particular. Banks should benefit from higher interest rates (and strong balance sheets), Energy from continued under-supply in oil and very strong cash flows, and Basis Resources from high metals demand – especially for electrification – in the face of very little incremental supply. Rising rates, especially higher real yields, disadvantage Growth stocks versus Value trades.

Importantly, the payoff asymmetry looks excellent. When a sector is in the tenth percentile or below of its long-term relative valuation, it tends to outperform over 6-month, 1-year and 3-year periods.

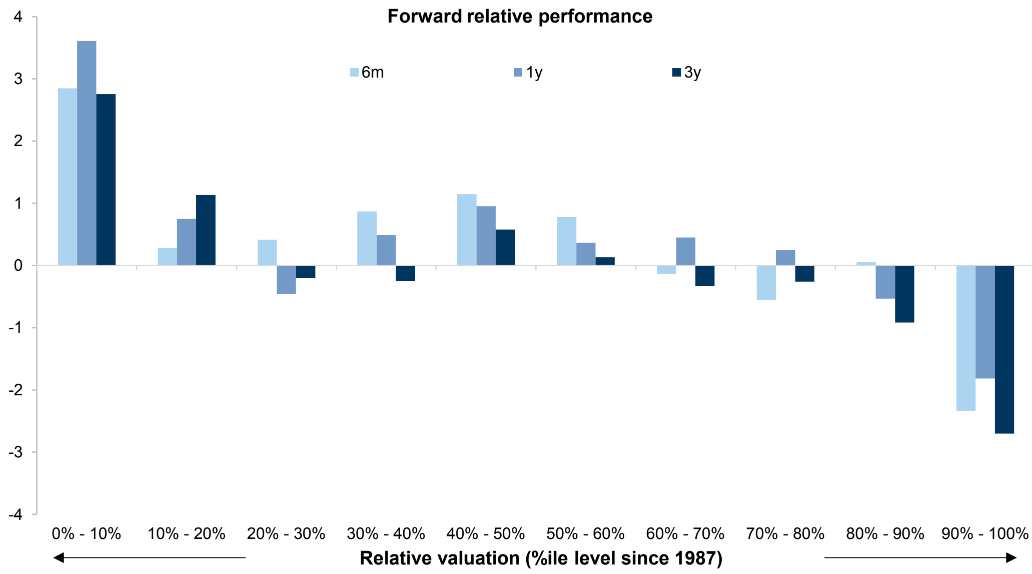
Exhibit 20: When a sector is in the tenth percentile or below of its long-term relative valuation, it tends to outperform over 6-month, 1-year and 3-year periods
Percentile relative valuation of each sector since 1987



Source: Datastream, Worldscope, Goldman Sachs Global Investment Research

Exhibit 21: ...and for those, the payoff asymmetry looks excellent

Median forward return for European sectors based on their relative valuation percentile at the outset



Source: Datastream, Worldscope, Goldman Sachs Global Investment Research

Conversely, when a sector is >90th of its historical relative valuation the payoff tends to be negative. These sectors are generally Growth Defensives at the moment, and we'd argue that there are good reasons for their relative expensiveness. But over the medium term, if and when the growth outlook starts to improve, their valuations premium makes them vulnerable, especially if rates are much higher.

At any point in between the valuation is not a big driver – like other indicators (our Risk appetite indicator (RAI) or our GS Bull/Bear indicator (GSBLBR)) they tend to be most helpful when at extremes.

Disclosure Appendix

Reg AC

We, Sharon Bell, Peter Oppenheimer, Guillaume Jaisson and Lilia Peytavin, hereby certify that all of the views expressed in this report accurately reflect our personal views, which have not been influenced by considerations of the firm's business or client relationships.

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

Disclosures

Regulatory disclosures

Disclosures required by United States laws and regulations

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

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

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

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

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

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

Global product; distributing entities

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

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

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

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

General disclosures

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

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

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

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

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

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

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

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

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

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

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

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

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