In this very special year-end edition of Top of Mind, our favorite quotes and charts from our 2021 pieces you’ll find. This report, which we hope you’ll bend at the seams, tells the story of four major 2021 themes.

We begin with inflation surprises across the globe, only some of which were driven by the pernicious microbe. And in markets, stubbornly low interest rates led to risk-taking, with SPACs, meme stocks and cryptos many investors chasing.

2021 also had US, EU and China policy shocks, some positive, some negative with various impacts on assets and stocks. And the last theme revolved around the major crises of our time: What COVID means for how we work, and solving climate change on the private sector’s dime.

We hope you’ve found our 2021 themes useful, and the charts we highlighted too. We also include our annual crossword; in this year’s pieces, you’ll find answers to the clues. Thank you for your readership, and sending you holiday cheer. We look forward to engaging with you again in the New Year.

Allison Nathan
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Gabriel Lipton Galbraith
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Jenny Grimberg
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Across:
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2. Jan Hatzius, GS Head of GIR and Chief Economist, doesn’t find the discussion of _______ very illuminating in the context of one-off spending increases, because _______ are a longer-run concept (Issue 97).
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24. Jeff Currie, GS Global Head of Commodities Research, argues that a _______ tax/price is the most efficient way to solve climate change (Issue 104).
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4. Michael Klausner, Professor of Business and Professor of Law at Stanford Law School, believes that the shareholder _______ inherent in the structure of SPACs has made them a bad deal for post-merger investors (Issue 95).
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"The volatility in individual stocks driven by casino-like trading is a by-product of a culture of extreme risk-taking... But today's investors also don't necessarily understand the amount of risk that they're taking."
– Arthur Levitt, Former Chair, US Securities and Exchange Commission
(Issue 96, February 25)

"Europe has seldom missed an opportunity to miss an opportunity over the last decade."
– Timothy Garton Ash, Professor, University of Oxford
(Issue 102, October 18)

"In surveying 50K full-time US and 15K UK workers, we've actually found that 20% of people don't want to work from home at all post-pandemic. Another 30% want to work from home five days a week and are happy to never return to the office again."
– Nicholas Bloom, Professor, Stanford University
(Issue 100, July 29)

"[SPACs] are by no means costless, in large part because their structure typically creates dilution for shareholders."
– Jay Ritter, Professor, University of Florida
(Issue 95, January 28)

"A core group of crypto people see this as—and I quote from the Blue Brothers here—"a mission from god... They will never sell. And because of that, bitcoin and ether can't go to zero."
– Michael Novogratz, Co-Founder and CEO, Galaxy Digital Holdings
(Issue 98, May 21)

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– Romano Prodi, Former Prime Minister of Italy and President of the European Commission
(Issue 102, October 18)

"To oversimplify somewhat, the private sector will need to provide the capital investments required to execute the transition, and governments will need to provide the fiscal support to smooth the transition."
– Mark Carney, UN Special Envoy for Climate Action
(Issue 104, December 13)

"[Chinese markets] are much riskier than what we thought six months ago. So caution should be the key watch word, and investors should fully understand what they are buying, and that prices are discounted to reflect this risk."
– George Magnus, Associate at the China Center, Oxford University
(Issue 101, September 13)

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– Jude Blanchette, Freeman Chair in China Studies, CSIS
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2021: the year of inflation surprises

Inflation surprised sharply to the upside in 2021, and should decline, but remain elevated, in 2022

Inflation has surprised to the upside across most of G10...

2021 Q4 GS core inflation forecasts: G10, % change vs. year ago

We see US core PCE inflation falling to 2.4% by end-2022...

Contributions to yoy core PCE inflation, bp

US shelter inflation should peak ~5.5% yoy in mid-2022...

% change vs year ago, % change ann. rate

...with a sizable swing in the boost from supply-constrained goods

Contribution to yoy core PCE from supply-constrained categories, bp

...and high demand for workers should keep US wage growth >4%

Wage growth, percent change vs year ago

Note: Composition-adjusted tracker shown post-2000; shading indicates recessions. Source: US Department of Labor, Goldman Sachs GIR.
Supply chain bottlenecks were a key source of inflationary pressure, but they should ease next year

94 ships are currently anchored off the coast of California
Container ships anchored at Ports of LA and Long Beach

Containers are dwelling for record times at WC ports
Days (weighted average, lhs), % of total containers (rhs)

Chassis dwell times remain high
Chassis street dwell times by size, week # (x-axis), days (y-axis)

Warehouse space is very tight
LMI Warehouse Utilization and Capacity Indices

Rail velocity and dwell times have improved, but still lagging
UNP train speed (mph, lhs) and dwell time (hours, rhs)
Labor market gains should continue in 2022, paving the way for three Fed hikes next year

Employment is still ~3.9mn short of pre-pandemic level…
Current vs. pre-pandemic employment, millions

...but we see unemployment falling below neutral rate in '22
US unemployment rate and Fed SEP NAIRU estimates, %

Wage growth has accelerated in 2H2021…
% change vs year ago, % change QoQ ann. rate

...and it's especially elevated for low-wage workers
Percent change vs. year ago

Labor force participation will likely remain below trend
Labor force participation rate decomposition, percent

Non-economic reasons are still holding some workers back
Reasons not urgently searching for a job, unemploy. workers, %

Yields rise, but remain low, as the COVID recovery continues.
...the surge in SPAC IPOs at the start of the year, but SPAC momentum lost some steam

SPAC IPOs surged amid falling US real rates
# of SPAC deals by week (lhs), US 10 real rate (rhs), %

But the number of closed SPAC mergers has started to slow
SPAC capital seeking target (lhs), announced deals (rhs), $bn

A majority of SPAC IPOs have been <$500mn
Total US SPAC IPOs by IPO proceeds, # of deals

SPAC deals have been concentrated in Tech
2020/21 US SPAC IPO acquisitions by target, % total funds raised

SPAC returns are highly dependent on point in the lifecycle
SPAC returns in excess of Russell 3000, pp

Note: Covers SPACs that have closed a merger since the start of 2000.
Source: Dealogic, Factset, Goldman Sachs GIR.
For those of us who still don’t know what a SPAC is…

Special Purpose Acquisition Companies: A guide

1. A sponsor decides to launch a SPAC

6. The SPAC sponsor looks for a target company to merge with, and either completes a merger within two years or returns the funds raised to investors and liquidates the SPAC

2. A holding company is created and investor roadshow completed

7. If a target company is identified, terms of a merger are negotiated and a letter of intent (LOI) is signed; additional capital is often raised to fund the transaction through a private investment in public equity (PIPE) raise

3. The sponsor covers the SPAC’s operating costs and acquires a block of shares typically amounting to 20% of post-IPO equity (the “promote”)*

8. The shareholders in the SPAC vote on the proposed merger (“de-SPAC” process); if the merger is not approved, the sponsor can continue to look for a target

4. The SPAC is listed on an exchange and units costing $10 and consisting of a common share and a fractional warrant are sold to investors**. The proceeds raised from the SPAC IPO are held in a trust account and invested in Treasury notes

9. If shareholders approve, the merger is executed; shareholders can choose to keep their shares, redeem them and receive their initial investment back plus interest, or sell them in the market

5. The units of the SPAC trade on the open market; the common shares and warrants are often separated and traded independently

10. The SPAC merges with the target company and begins trading under a new ticker

*Some SPACs include smaller promotes or have the sponsor receive warrants rather than a percentage of the common shares. Some SPACs also build an earn-out into the promote to allow the target company to recoup shares if its stock price hits a predetermined level.

**Each whole warrant entitles the investor to purchase one common share.

Source: CB Insights, Harvard Law School Forum on Corporate Governance, various news sources, Goldman Sachs GIR.
Amid the meme stock frenzy, retail traders left their mark on markets…

**Retail activity: Up, but still a modest share of the market**

While the dollar value of retail trades has continued to rise… …retail activity still accounts for a small share of the market

![The dollar value of small-lot shares trading is up 25% since February 2021](chart1)

![Retail’s share of stock trading has remained relatively stable since February 2021](chart2)

Note: We define a small-lot share trade as trades of less than $2,000 and use as a proxy for retail trading.

**While all trading volumes are up, single stock options continue to see exceptional growth**

Total options volumes are +122% of total share volumes… …and single stock call volumes have risen by $10bn+ since Feb

![Investors have continued to utilize options to express views on single stocks while putting limited capital at risk](chart3)

![Call buying strategies are significantly less concerning than buying stocks on margin, as buyers of call options risk only their premium paid](chart4)

**Retail trading activity has continued to be a valuable signal for stock differentiation**

Highly retail-traded stocks have outperformed…

Total return of buying stocks in the top quintile and selling other quintiles on the basis of % options volume from retail trades

...as have stocks with a high probability of a short squeeze

![1-week outperformance (lhs) % of obs with >1 std outperformance (rhs)](chart5)

Note: We define a small-lot options trade as any trade where the number of contracts*stock price is less than 5,000.
Source: Ivy, Goldman Sachs GIR.

Special thanks to John Marshall, Head of Derivatives Research in GS Global Investment Research, and his team for these charts, which they compiled using a proprietary “big data” approach of analyzing the size of every trade in every stock on every day to track trends in retail trading activity.
...and cryptocurrencies remained all the rage...

**BTC and ETH are the highest returning assets YTD**

<table>
<thead>
<tr>
<th>Asset</th>
<th>Total Returns YTD, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bitcoin (BTC)</td>
<td>345.0</td>
</tr>
<tr>
<td>Ethereum (ETH)</td>
<td>250.0</td>
</tr>
<tr>
<td>S&amp;P 500</td>
<td>15.0</td>
</tr>
<tr>
<td>MSCI World</td>
<td>12.0</td>
</tr>
<tr>
<td>Gold</td>
<td>10.0</td>
</tr>
<tr>
<td>US 30y</td>
<td>6.0</td>
</tr>
<tr>
<td>German 30y</td>
<td>3.0</td>
</tr>
<tr>
<td>Note: Total returns in USD; all market prices as of December 14, 2021. Source: Bloomberg, Goldman Sachs GIR.</td>
<td></td>
</tr>
</tbody>
</table>

**Note:** Total returns in USD. Source: Bloomberg, Goldman Sachs GIR.

**Crypto remains far more volatile than other assets**

<table>
<thead>
<tr>
<th>Asset</th>
<th>Average Daily Volatility in Ann. Terms, %</th>
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<tbody>
<tr>
<td>Ether</td>
<td>85.0</td>
</tr>
<tr>
<td>Bitcoin</td>
<td>70.0</td>
</tr>
<tr>
<td>Oil</td>
<td>45.0</td>
</tr>
<tr>
<td>Silver</td>
<td>40.0</td>
</tr>
<tr>
<td>Nasdaq</td>
<td>35.0</td>
</tr>
<tr>
<td>S&amp;P 500</td>
<td>30.0</td>
</tr>
<tr>
<td>Gold</td>
<td>25.0</td>
</tr>
<tr>
<td>US 10y</td>
<td>20.0</td>
</tr>
<tr>
<td>DXY</td>
<td>15.0</td>
</tr>
<tr>
<td>Note: Based on returns since 2014 and since 2015 for ether. Source: Bloomberg, Goldman Sachs GIR.</td>
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**The mkt cap of BTC & ETH is ~$1.4tn vs. ~$2.9tn for gold**

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<tr>
<td>BTC</td>
<td>1.35</td>
<td>1.40</td>
<td>1.45</td>
<td>1.50</td>
<td>1.55</td>
<td>1.60</td>
<td>1.65</td>
</tr>
<tr>
<td>ETH</td>
<td>0.75</td>
<td>0.80</td>
<td>0.85</td>
<td>0.90</td>
<td>0.95</td>
<td>1.00</td>
<td>1.05</td>
</tr>
<tr>
<td>Gold</td>
<td>1.85</td>
<td>1.90</td>
<td>1.95</td>
<td>2.00</td>
<td>2.05</td>
<td>2.10</td>
<td>2.15</td>
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**Note:** Crypto market cap. vs private investment gold stock, $tn. Source: Coin Metrics, Goldman Sachs GIR.

**Activity on Bitcoin and Ethereum networks is around 2018 highs**

<table>
<thead>
<tr>
<th>Total Active Addresses, Million</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
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<tbody>
<tr>
<td>BTC</td>
<td>0.01</td>
<td>0.03</td>
<td>0.05</td>
<td>0.07</td>
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<td>0.06</td>
<td>0.08</td>
<td>0.10</td>
<td>0.12</td>
<td>0.14</td>
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</tbody>
</table>

**Note:** Total active addresses, million. Source: Coin Metrics, Goldman Sachs GIR.

**More than 75% of BTC is held in profit today**

<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>Bitcoin (lhs)</td>
<td>45.0</td>
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</tr>
<tr>
<td>Ether (lhs)</td>
<td>35.0</td>
<td>50.0</td>
<td>65.0</td>
<td>75.0</td>
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<td>90.0</td>
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<td>Litecoin (lhs)</td>
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<tr>
<td>XRP (lhs)</td>
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<tr>
<td>Dogecoin (rhs)</td>
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<td>20.0</td>
<td>25.0</td>
<td>30.0</td>
<td>35.0</td>
</tr>
</tbody>
</table>

**Note:** Percent of total supply in the network with positive balance, %. Source: Coin Metrics, Goldman Sachs GIR.
2021: positive, and negative, policy shocks

US: Biden’s fiscal revolution faced reality in Congress...

White House proposals:
- American Jobs Plan: ~$2.5tn
- American Families Plan: ~$1.9tn
Total: $4.4tn

Congressional bills:
1. Enacted infrastructure bill: $536bn
2. Senate competitiveness bill: $240bn
3. Build Back Better Act: ~$2.06tn
Total: ~$2.72tn

Note: All figures represent total over 10yrs; updated figures based on measures passed in enacted infrastructure bill or currently under consideration in the Senate Competitiveness bill and BBB Act as passed in the House; $2.7tn total figure for Congressional bills includes some figures (partial reinstatement of SALT deduction and additional healthcare measures) that aren’t included in the diagram; immigration-related fiscal effects included in the BBB Act total but excluded from the total from all Congressional proposals; the $65bn in spending for community college, higher ed. and workforce incentives listed twice because relevant proposals were included in both the AJP and the AFP, but to avoid double counting these measures are included in the updated total for AJP-related measures only.

Source: White House, Congressional Budget Office, Goldman Sachs GIR.
The Progressive Era was marked by relatively ideological parties and political polarization…

...but by the New Deal Era, both parties had become more moderate and Congress was less polarized…

...while Democrats moved slightly left during Johnson’s Great Society, the decline in polarization continued…
...but by the Reagan years, polarization increased again as Republicans became more ideological...
I ideological scores of Senate (left) and House (right) members of the 99th Congress (1985-1987)

...and both parties became more ideological during the Obama years, increasing polarization further...
I ideological scores of Senate (left) and House (right) members of the 112th Congress (2011-2013)

...a trend which has continued and even grown today
I ideological scores of Senate (left) and House (right) members of the current Congress

Note: Ideological scores are calculated using methodology developed by Keith T. Poole and Howard Rosenthal, which aggregates all roll call votes cast in each legislative session; vote scores of each member of Congress range from most liberal (-1 to 0) to most conservative (0 to +1); y-axis is a frequency measure for each score range; analysis excludes votes by independents and any third parties.

Source for all charts: Jeffrey B. Lewis, Keith Poole, Howard Rosenthal, Adam Boche, Aaron Rudkin, Luke Sonnet (2021), Voteview: Congressional Roll-Call Votes Database, Pew Research Center, Goldman Sachs GIR.
China: all about the regulatory surprises

January 13: CBIRC sets rating standards for consumer loan companies

January 22: SAMR fines Simcere Pharma for abusing market leadership

February 7: SAMR releases official guidance for anti-monopoly rules targeting platform economics

February 8: SAMR imposes fines on Vipshop for unfair competition

February 8: 4th batch of Centralized Procurement of Drugs is announced, with average price reductions of 52%

March 3: SAMR imposes fines on five community group purchase companies for improper behavior

March 22: CAC finalizes new policy on personal data collection by mobile apps

April 10: SAMR imposes fines on Alibaba for monopolistic behaviors

April 17: SAMR announces it will launch price-gouging investigations into chip distributors and chemical fertilizer manufacturers/dealers

May 10: SAMR announces fines on Alibaba and Tencent-backed businesses for misleading pricing and false marketing

May 10: CAC announces violations in personal data collection by 84 apps across phone security and online borrowing

June 1: SAMR announces fines on 15 afterschool tutoring (AST) companies for misleading pricing and false marketing

June 13: CBIRC announces fines on several major banks and payment companies to curtail cryptocurrency trading

July 4: CAC removes Didi and associated apps from app store

August 3: A state media outlet calls online gaming “spiritual opium” in an editorial; article is subsequently deleted and republished without references to “opium”

August 3: SAMR announces it will launch investigations into chip distributors and chemical fertilizer manufacturers/dealers

August 10: SAMR announces fines on Alibaba for monopolistic behaviors

August 17: SAMR issues draft rules aimed at halting unfair competition on internet platforms

August 17: President Xi chairs the 10th meeting for the Central Government Financials and Economics Committee aimed at, among other things, investigating “wealth redistribution for common prosperity”

August 30: NPPA publishes new rules to limit online gaming times for minors

September 24: PBOC says that cryptocurrencies have no legal tender status. 10 other agencies list cryptocurrency mining as a sector to be entirely phased out following the PBOC notice

October 29: CAC removes Didi and associated apps from app store

November 26: SAMR publishes draft Measures for the Administration of Internet Advertisements

December 8: Policymakers reported to be drafting a blacklist that is expected to restrict tech startups from using VIEs to raise international capital and listing overseas

Source: MSCI, Goldman Sachs GIR.

Special thanks to the GS Asia Strategy team for their help with this exhibit.
…that caught China tech in the crosshairs

China has seen an unprecedented regulatory tightening
POE (privately owned enterprise) regulatory proxy, $z$-score

![Graph showing the tightening of policy stance, episodes, and COVID disruption]

Note: POE regulation proxy reflects the text-mining results of news among POE heavy sectors. Data points during Mar-Jun 2020 have been removed due to COVID disruptions.
Source: Factiva, MSCI, FactSet, Goldman Sachs GIR (Asia Strategy team).

China tech has lost ~$1.5tn in market cap since February
Total listed market cap of Chinese internet/tech stocks, $tn

![Graph showing market cap changes]

Note: *Includes all stocks, *excluding stocks listed after Feb 17.
Source: FactSet, MSCI, Bloomberg, Goldman Sachs GIR.

China's Internet stocks trade at a sizable discount to US peers
Forward P/E, multiple

![Graph comparing China Internet (Offshore) Forward 12M P/E to US Internet/Software Forward 12M P/E]

Source: FactSet, MSCI, Goldman Sachs GIR.

Consensus EPS for offshore Internet has fallen ~38% YTD
MXCN EPS revision (Average of 2021/22 EPS, CNY) %

![Graph showing consensus EPS revisions for offshore Internet]

Note: *POEs are privately-owned enterprises and SOEs are state-owned enterprises; bracketed numbers represent 2020-22E EPS CAGR on consensus estimates.
Source: FactSet, Goldman Sachs GIR.

Fair value of China POEs depends on profit profile
MSCI China fair value (current=100) based on ROE assumption

![Graph showing cumulative present value for # of future years (end at year-30)]

Note: Under a DCF model, with fixed ERP (= current market implied), near-term growth (consensus) and other model assumptions.
Source: FactSet, Goldman Sachs GIR.

Offshore Chinese IPO volumes have fallen since June
Number of IPOs of mainland Chinese companies by venue

![Bar chart showing number of IPOs by month and venue]

Source: Wind, Bloomberg, Goldman Sachs GIR.
For those of us who need a refresher on how China regulates…the following slide offers a visual representation of the regulatory landscape, including key players and their responsibilities.
EU: the Recovery Fund that bolstered fiscal support was a positive development...

What is it?

The Recovery and Resilience Facility (RRF) is the centerpiece of the Next Generation EU (NGEU) fund, a €807bn (in current prices) temporary recovery instrument aimed to help repair the economic and social damage to the EU from the COVID-19 pandemic. Beyond repairing the immediate damage from the pandemic, the RRF is designed to make EU economies more sustainable, resilient, and better prepared for the green and digital transitions underway around the world. As a part of this, each country that is approved to receive funds from the RRF must commit to spending a minimum of 37% of expenditures on climate investments and reforms, and a minimum of 20% to support their digital transitions.

How are funds disbursed to member countries?

EU countries submit National Recovery and Resilience Plans (NRRP) to the European Commission. Within these plans, member states request their desired amount of grants and loans.

The Commission assesses the plans across 11 criteria, including whether the plans meet the 37% climate expenditure target and the 20% digital expenditure target outlined in the RRF Regulation.

Following each assessment, the Commission adopts a proposal for a Council Implementing Decision, and the European Council then has four weeks to adopt the Commission’s proposal.

Once the Council has adopted the proposal, the Commission concludes the financing/loan agreement with the member country.

After signature, the Commission makes a 13% (of the total grant and loan allocation) pre-financing payment available to the member country.

Further payments are linked to performance. Disbursements will be authorized at most twice a year based on satisfactory fulfillment of set milestones and targets.

Funding mix

The RRF total: €723.8bn

- €338bn of grants
- €385.8bn of loans

Loans are disbursed with light conditionality at very low rates. Countries can request a loan worth up to 6.8% of 2019 GNI as part of submission of NRRPs or until August 2023 if NRRPs have already been submitted.

How will this be paid for?

To finance NGEU, and the RRF by extension, the European Commission, on behalf of the EU, borrows money on the capital markets at more favorable rates than individual member states. Net borrowing operations are scheduled to end by 2026, and repayment to start in 2028 and continue until 2058. The loans will be repaid, through the Commission, by the borrowing member states, and the grants by the EU budget (any grants requested over the maximum amount allowed per country will be financed by that country). To do so, the Own Resources Decision (ORD), which establishes how the EU budget is financed and was ratified on May 31, 2021 by all member states, raised the maximum level of resources that can be called for from member states from 1.2% to 1.4% of EU GNI. It also provides for a temporary increase in the ORD ceiling by an additional 0.6%, to be used exclusively for servicing the RRF debt. Additional sources of revenue are expected to be linked to a carbon border adjustment mechanism, a digital tax, and the EU Emission Trading System, although these have not yet been approved.

Southern European countries at the forefront

22 countries have been authorized to receive funds so far* Funds received as advance on total requested, € billions

- First batch (7/13/21)
- 7/28/21
- 9/8
- 10/29/21

*Ireland was approved to receive funds at the same time as Czechia and Malta was approved to receive funds on 10/5/2021, but no funds have yet been disbursed.

Source for all exhibits: European Commission, European Council, Goldman Sachs GIR.
...but EU integration still lags
2021: tackling the major crises of our time

The post-pandemic future of work continues to evolve...

The share of remote work has plateaued ~40%
Share of US paid full days worked from home, %

Remote work is more common among the highly educated
Share of workers who worked remotely at all during pandemic, %

Most workers still prefer fully remote or fully in-office work
Preferred employee WFH days after COVID (2022+), %

While employers favor a return to office
Preferred employer WFH days after COVID (2022+), %

Workers continue to report being more productive from home
Workers’ self-stated productivity during WFH vs in office, %

And the perceived stigma around WFH has further improved
Change in perception of WFH among people you know, %

Note: Pre-COVID estimate from 2017-18 American Time Use Survey; post-COVID estimate based on employers’ expectations in Nov. survey wave. Source: Survey of Working Arrangements and Attitudes, BLS, Goldman Sachs GIR.

Note: Based on all survey waves since May 2020. Source: Survey of Working Arrangements and Attitudes, Goldman Sachs GIR.

Note: Based on all survey waves since May 2020, excludes respondents with no employer. Source: Survey of Working Arrangements and Attitudes, Goldman Sachs GIR.

Note: Based on all survey waves since July 2020. Source: Survey of Working Arrangements and Attitudes, Goldman Sachs GIR.

Goldman Sachs Global Investment Research
A big gap exists between emissions goals vs current policy...
IPCC emissions scenarios vs current policy/pledges, Gt CO2

Note: Scenarios based on IPCC Shared Socio-economic pathways; temperature ranges reflect long-term estimate based on emissions path; BAU refers to baseline without new mitigation policies; current pledges based on country-level NDC commitments as of October 2021.
Source: IPCC, IMF, Goldman Sachs GIR.

Low cost de-carbonization is concentrated in power today...
2021 carbon abatement cost curve, $/ton CO2 eq.

Note: Represents cumulative total figure for global investment by 2050.
Source: Goldman Sachs GIR.

~$56tn of investment needed for global Net Zero carbon
Cumulative infra. investment in GS 1.5 °C net zero model, $tn

Note: This only reflects incremental investment; doesn’t include maint/capex.
Source: Goldman Sachs GIR.

Goldman Sachs Global Investment Research

...and we still have a long way to go to solve climate change

...requiring large emissions reductions in most economies
Emissions baseline under BAU vs 2030 targets, Gt CO2

Note: Baseline reflects estimate of total CO2 emissions in BAU scenario, doesn’t include all GHG emissions; NDC targets are the unconditional target or, where available, the average of the conditional and unconditional target; two listed countries’ pledges (India and Russia) remain higher than BAU scenario.
Source: IPCC, IMF, Goldman Sachs GIR.

...requiring steep CO2 cuts in power in <1.5 °C scenario
CO2 emissions in GS 1.5 °C scenario by sector, GtCO2

Source: Goldman Sachs GIR.

Investment to reach >2% of GDP by 2032 in 1.5°C scenario
Ann. infra. investment for net zero by 2050, $tn; as % GDP (rhs)

Note: This only reflects incremental investment; doesn’t include maint/capex.
Source: Goldman Sachs GIR.
The private sector is stepping up to tackle the climate problem...

ESG equity inflows have outpaced non-ESG inflows...
Cumulative mon. global flows for ESG/non-ESG equity funds, $bn

...alongside investors' growing commitment to the PRI
PRI signatory growth (rhs) and AUM (lhs, $tn)

Note: The Principles of Responsible Investment (PRI) have required signatories to incorporate ESG considerations into at least 50% of their AUM since 2020, AUM as of March 30, 2021.

ESG integration and screening are the top fund strategies...
Sustainable investing assets by strategy (2020), $tn

...but exclusionary strategies have seen larger inflows recently
Global ESG equity fund flows by category, $bn

Companies with low E&S scores have underperformed
Cumulative performance by SUSTAIN E&S headline percentiles, %

The multiple spread between ESG leaders/laggards is growing
12m fwd EV/EBITDA & relative premium (trimmed mean) (lhs), Q1 vs. Q5 SUSTAIN Operational E&S (rhs); E&S disclosure>50%
...but carbon prices are still the most efficient solution for solving climate change
<table>
<thead>
<tr>
<th>Issue</th>
<th>Title</th>
<th>Date</th>
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<tbody>
<tr>
<td>104</td>
<td>Investing in climate change 2.0</td>
<td>December 13, 2021</td>
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<tr>
<td>103</td>
<td>Inflation: here today, gone tomorrow?</td>
<td>November 17, 2021</td>
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<td>102</td>
<td>Europe at a Crossroads</td>
<td>October 18, 2021</td>
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<td>101</td>
<td>Is China Investable?</td>
<td>September 13, 2021</td>
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<td>100</td>
<td>The Post-Pandemic Future of Work</td>
<td>July 29, 2021</td>
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<td>Bidenomics: evolution or revolution?</td>
<td>June 29, 2021</td>
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<td>98</td>
<td>Crypto: A New Asset Class?</td>
<td>May 21, 2021</td>
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<td>97</td>
<td>Reflation Risk</td>
<td>April 1, 2021</td>
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<td>96</td>
<td>The Short and Long of Recent Volatility</td>
<td>February 25, 2021</td>
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<td>95</td>
<td>The IPO SPAC-tacle</td>
<td>January 28, 2021</td>
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<td>94</td>
<td>What’s In Store For the Dollar</td>
<td>October 29, 2020</td>
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<td>93</td>
<td>Beyond 2020: Post-Election Policies</td>
<td>October 1, 2020</td>
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<td>92</td>
<td>COVID-19: Where We Go From Here</td>
<td>August 13, 2020</td>
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<td>91</td>
<td>Investing in Racial Economic Equality</td>
<td>July 16, 2020</td>
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<td>Daunting Debt Dynamics</td>
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<td>Reopening the Economy</td>
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<td>Oil’s Seismic Shock</td>
<td>March 31, 2020</td>
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<td>Roaring into Recession</td>
<td>March 24, 2020</td>
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<td>2020’s Black swan: COVID-19</td>
<td>February 28, 2020</td>
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<td>85</td>
<td>Investing in Climate Change</td>
<td>January 30, 2020</td>
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<td>Fiscal Focus</td>
<td>November 26, 2019</td>
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<td>83</td>
<td>Growth and Geopolitical Risk</td>
<td>October 10, 2019</td>
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<td>82</td>
<td>Currency Wars</td>
<td>September 12, 2019</td>
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<td>Central Bank Independence</td>
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<td>Dissecting the Market Disconnect</td>
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<td>Trade Wars 3.0</td>
<td>June 6, 2019</td>
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<td>EU Elections: What’s at Stake?</td>
<td>May 8, 2019</td>
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<td>Buyback Realities</td>
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<td>The Fed’s Dovish Pivot</td>
<td>March 5, 2019</td>
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<td>Where Are We in the Market Cycle?</td>
<td>February 4, 2019</td>
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<td>What’s Next for China?</td>
<td>December 7, 2018</td>
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<tr>
<td>73</td>
<td>Making Sense of Midterms</td>
<td>October 29, 2018</td>
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</table>

Source of photos: www.istockphoto.
Watching

- **Globally**, we expect full-year growth of 6.0% in 2021 and 4.5% in 2022, more than 1pp above potential, thanks to continued medical improvements, a consumption boost from pent-ups savings, and inventory rebuilding, but the prospect of a winter COVID wave and a drag from the Omicron variant pose downside risk.

- **In the US**, we expect full-year growth of 5.7% in 2021 and 3.9% in 2022. We expect a modest drag on growth from the Omicron variant in 1Q22 and see a gradual slowdown next year as the positive impulses from continued reopening, pent-up saving and inventory restocking contend with a steady headwind from diminishing fiscal support. We expect core PCE inflation will continue to rise to 4.1% by end-2021 before falling to 4.1% and 3.5% by the end of 2021 and 2022, respectively.

- **The Fed** has announced that it will double the pace of the tapering of asset purchases to $30bn per month in January. We expect the first rate hike in March, followed by additional hikes in June and September. We expect balance sheet runoff will begin in 4Q22. On the fiscal policy front, we expect the passage of additional spending of around $1.75-$2tn focused on infrastructure, social benefits, and long-term investment, though we see growing downside risk to the final bill becoming law.

- **In the Euro area**, we expect full-year growth of 5.1% in 2021 and see risks skewed toward the downside amid the recent sharp rise in COVID case growth and the emergence of the Omicron variant. But we remain constructive on the outlook for the latter part of next year and expect growth of 4.3% in 2022 given a likely easing of industrial bottlenecks, significant catch-up room for services spending, and persistent fiscal support. We expect core inflation to fall sharply in January 2022 as base effects wash out, and reach 1.4% by December 2022.

- The ECB recently announced that it will end net PEPP purchases in March while providing an "APP bridge" to September 2021, though we expect it will maintain flexibility against downside risks via PEPP through flexible reinvestments and the option to reactivate PEPP. We expect the first rate hike in 2022, but risks are skewed toward an earlier lift-off.

- **In China**, we expect below-consensus real GDP growth of 7.8% in 2021 and 4.8% in 2022. While recent dovish/pro-growth policy actions have reduced the left-tail risk to our 2022 growth forecast, property market developments remain a key downside risk to watch in the coming months.

**WATCH CORONAVIRUS.** The Omicron variant poses near-term risks to the global medical and economic outlook. Although the range of possible outcomes remains wide given remaining uncertainty about the transmissibility, degree of protection from vaccines and prior infections, and disease severity of the new variant, medical evidence so far suggests that Omicron is transmitting more quickly than Delta, but is evading immunity against hospitalizations only slightly more.

---

**Summary of our key forecasts**

*Source: Haver Analytics and Goldman Sachs Global Investment Research.*

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**Forecasts**

**Economics**

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<th>GDP growth (%)</th>
<th>2021</th>
<th>2022</th>
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<td>GS Cons.</td>
<td>6.0</td>
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<tr>
<td>GS Cons.</td>
<td>4.5</td>
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**Interest rates (Yr %)**

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<tr>
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<tbody>
<tr>
<td>EUR/ $</td>
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<td>GBP/ $</td>
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<td>0.30</td>
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<tr>
<td>JPY/ $</td>
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<tr>
<td>GBP/ JPY</td>
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**Markets**

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<tr>
<td>GS Cons.</td>
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<tr>
<td>GS Cons.</td>
<td>1.13</td>
<td>1.15</td>
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**Equities**

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<tr>
<th>Returns (%)</th>
<th>12m</th>
<th>YTD</th>
<th>E2021 P/E</th>
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<td>S&amp;P500</td>
<td>9.0</td>
<td>24.0</td>
<td>23.1x</td>
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**Policy rates (%)**

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<tr>
<th>Policy rates (%)</th>
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<th>2022</th>
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<tr>
<td>GS Mkt.</td>
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<tr>
<td>GS Wkt.</td>
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**Commodities**

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<th>Last</th>
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<td>USD</td>
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<td>JPY</td>
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**Consumer**

<table>
<thead>
<tr>
<th>CPI (%)</th>
<th>Unemp. Rate</th>
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<tr>
<td>7.0</td>
<td>4.1</td>
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**Wage Tracker 2021 (%)**

<table>
<thead>
<tr>
<th>Q1</th>
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<th>Q4</th>
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<td>12.1</td>
<td>12.6</td>
<td>7.7</td>
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Crossword from pg. 2 of this report:

Puzzle solutions

# Current Activity Indicator (CAI)

GS CAIs measure the growth signal in a broad range of weekly and monthly indicators, offering an alternative to Gross Domestic Product (GDP). GDP is an imperfect guide to current activity: In most countries, it is only available quarterly and is released with a substantial delay, and its initial estimates are often heavily revised. GDP also ignores important measures of real activity, such as employment and the purchasing managers’ indexes (PMIs). All of these problems reduce the effectiveness of GDP for investment and policy decisions. Our CAIs aim to address GDP’s shortcomings and provide a timelier read on the pace of growth.  

# Dynamic Equilibrium Exchange Rates (DEER)

The GSDEER framework establishes an equilibrium (or “fair”) value of the real exchange rate based on relative productivity and terms-of-trade differentials.  

# Financial Conditions Index (FCI)

GS FCIs gauge the “looseness” or “tightness” of financial conditions across the world’s major economies, incorporating variables that directly affect spending on domestically produced goods and services. FCIs can provide valuable information about the economic growth outlook and the direct and indirect effects of monetary policy on real economic activity.  
FCIs for the G10 economies are calculated as a weighted average of a policy rate, a long-term risk-free bond yield, a corporate credit spread, an equity price variable, and a trade-weighted exchange rate; the Euro area FCI also includes a sovereign credit spread. The weights mirror the effects of the financial variables on real GDP growth in our models over a one-year horizon. FCIs for emerging markets are calculated as a weighted average of a short-term interest rate, a long-term swap rate, a CDS spread, an equity price variable, a trade-weighted exchange rate, and—in economies with large foreign-currency-denominated debt stocks—a debt-weighted exchange rate index.  

# Goldman Sachs Analyst Index (GSAI)

The US GSAI is based on a monthly survey of GS equity analysts to obtain their assessments of business conditions in the industries they follow. The results provide timely “bottom-up” information about US economic activity to supplement and cross-check our analysis of “top-down” data. Based on analysts’ responses, we create a diffusion index for economic activity comparable to the ISM’s indexes for activity in the manufacturing and nonmanufacturing sectors.

# Macro-Data Assessment Platform (MAP)

GS MAP scores facilitate rapid interpretation of new data releases for economic indicators worldwide. MAP summarizes the importance of a specific data release (i.e., its historical correlation with GDP) and the degree of surprise relative to the consensus forecast. The sign on the degree of surprise characterizes underperformance with a negative number and outperformance with a positive number. Each of these two components is ranked on a scale from 0 to 5, with the MAP score being the product of the two, i.e., from -25 to +25. For example, a MAP score of +20 (5;+4) would indicate that the data has a very high correlation to GDP (5) and that it came out well above consensus expectations (+4), for a total MAP value of +20.
Disclosure Appendix

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