Goldman Sachs | Economics Research

5 September 2023 | 2:01AM EDT

US Economics Analyst

The US Consumer: Still Strong in 2024 (Briggs)

- GDP growth has outperformed in 2023 on the back of strong consumer spending, itself driven by an acceleration in real income growth to around 4% (Q4/Q4 basis; GS forecast). Whether spending continues to grow at a robust pace depends heavily on the income outlook, so in this *US Economics Analyst* we update our income forecasts and argue that the US consumer will likely outperform again in 2024.
- Several of the drivers of income growth in 2023 are likely to repeat in 2024. Continued job gains and positive real wage growth should continue to boost real income, and household interest income should increase as yields on interest bearing assets rise to reflect past rate increases. And while transfer income faces a headwind from declining Medicaid coverage following the end of pandemic-related eligibility expansion, the spending impact from coverage loss will likely be modest.
- After incorporating these drivers into our forecast, we expect real income will grow by 3% in 2024 on a Q4/Q4 basis. While this pace of income growth would normally imply 2-3% real spending growth, the spending response will likely be smaller than normal because some drivers—namely rising interest income—will mostly benefit higher-income households that have a lower propensity to spend. Indeed, we forecast almost 4% real income growth for households in the top income quintile, vs. 1½% in the bottom quintile.
- We see several other reasons why spending growth will underperform income growth in 2024. Rising interest expenses not included in the disposable income calculation will likely effectively subtract ½pp from income growth through end-2024. And while household balance sheets remain strong overall, balance sheets of lower-income households have likely weakened, and we expect that the saving rate will rise from a quite low 3.5% today to over 5% by the end of next year. That said, our scenario analysis suggests that real spending will likely grow above or close to its potential pace unless the labor market deteriorates more than we anticipate.
- Taken together, we expect that income growth will remain a tailwind to spending in 2024, albeit a smaller one than in 2023. Provided that job and real wage growth don't significantly underperform our forecasts, we expect that the US consumer will outperform consensus expectations, and forecast 1.9% real

Jan Hatzius
+1(212)902-0394 | jan.hatzius@gs.com
Goldman Sachs & Co. LLC

Alec Phillips
+1(202)637-3746 | alec.phillips@gs.com
Goldman Sachs & Co. LLC

David Mericle
+1(212)357-2619 |
david.mericle@gs.com
Goldman Sachs & Co. LLC

Spencer Hill, CFA
+1(212)357-7621 | spencer.hill@gs.com
Goldman Sachs & Co. LLC

Ronnie Walker
+1(917)343-4543 |
ronnie.walker@gs.com
Goldman Sachs & Co. LLC

Tim Krupa
+1(202)637-3771 | tim.krupa@gs.com
Goldman Sachs & Co. LLC

Manuel Abecasis
+1(212)902-8357 |
manuel.abecasis@gs.com
Goldman Sachs & Co. LLC

Joseph Briggs
+1(212)902-2163 |
joseph.briggs@gs.com
Goldman Sachs & Co. LLC

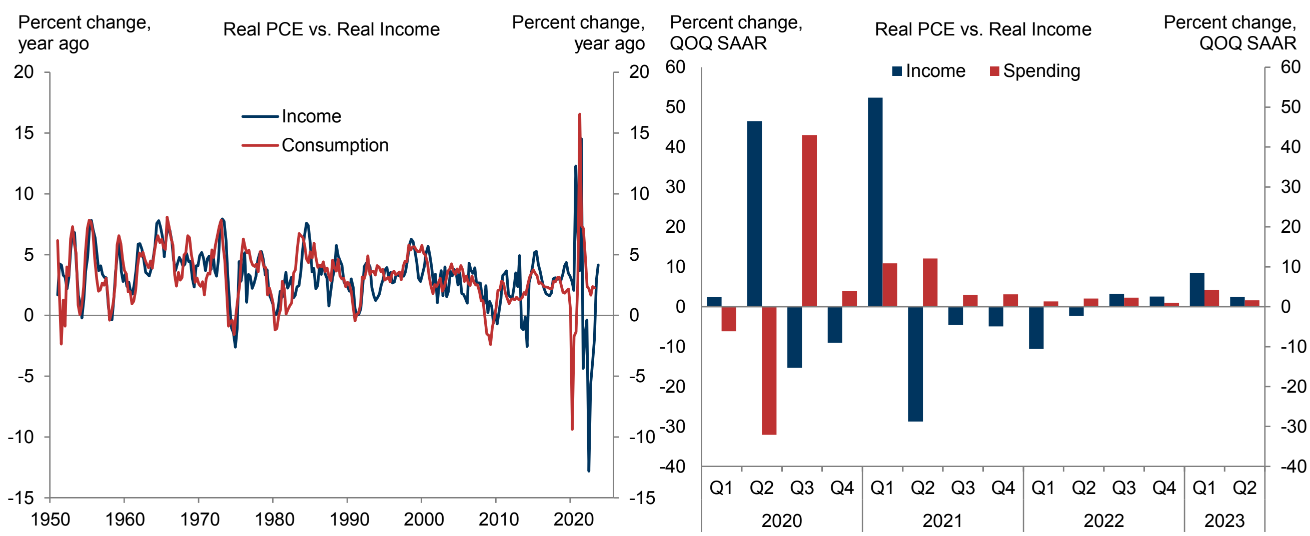
spending growth in 2024 in both yoy (vs. 0.9% consensus) and Q4/Q4 (vs. +1.2%) terms.

The US Consumer: Still Strong in 2024

GDP growth has outperformed in 2023 so far on the back of strong real consumer spending, which grew by 4.2% (qoq ar) in Q1, 1.7% in Q2, and is currently tracking at 3.2% in Q3.

As we noted last September and reiterated in several reports earlier this year, real spending growth is affected by a number of different factors—our standard consumption model forecasts consumption growth based on real disposable personal income (DPI) growth, changes in financial and housing wealth, credit availability, and consumer sentiment—but is typically most sensitive to real income growth (left chart, Exhibit 1). Although the tight historical link between income and consumption broke down during the pandemic due to the economic shutdown and unusually large swings in fiscal transfers, the relationship has reasserted itself in recent quarters, with spending growth largely tracking the cadence of income growth since mid-2022 (right chart, Exhibit 1).

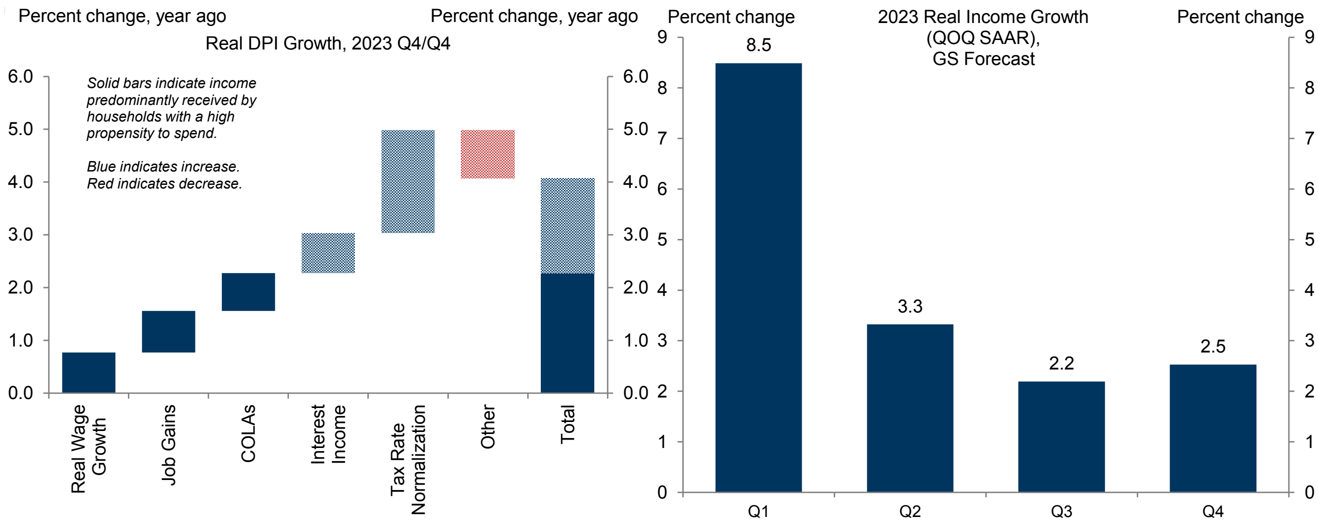
Exhibit 1: – Real Income Growth Has Historically Driven Real Spending Growth, and the Relationship Between Spending and Income Is Normalizing After It Broke Down During the Pandemic



Source: Goldman Sachs Global Investment Research

The strength in spending was therefore largely predictable, since income growth was very likely to grow at a robust pace in 2023 barring major job losses (Exhibit 2). In particular, cost-of-living adjustments and a normalization of the effective tax rate—which surged in 2022 due to outsized tax payments on capital gains that had occurred in 2021—provided a large boost to income growth in Q1, while still plentiful labor demand has kept job gains and nominal wage growth very elevated. As a result, real income looks set to grow by around 4% in 2023 (Q4/Q4 basis; GS forecast), a pace that is well above its historical average but consistent with the above-potential real spending growth observed thus far in 2023.

Exhibit 2: The Spending Outperformance in 2023 Reflects Robust Real Income Growth, Particularly at the Start of the Year



Source: Goldman Sachs Global Investment Research

Whether spending—and by extension, overall GDP—continues to grow at a robust pace depends heavily on the income outlook. Therefore, in this *US Economics Analyst* we update our income forecasts and argue that the US consumer and broader growth will likely outperform expectations again in 2024, consistent with the expectations of our consumer equity analysts.

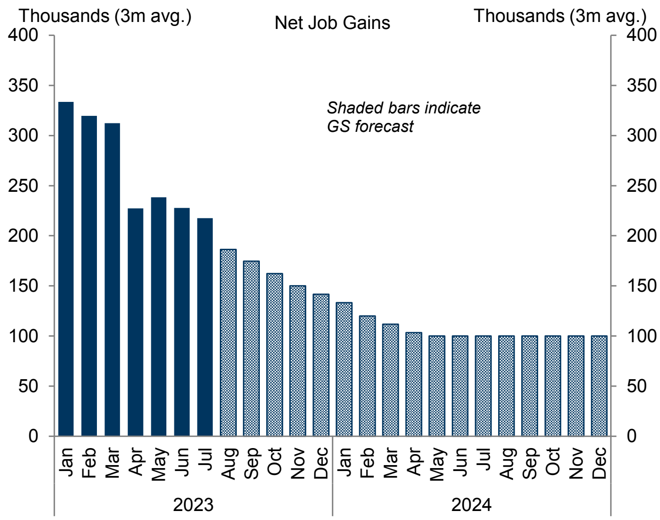
Income Drivers in 2024 Will Look Somewhat Similar to 2023

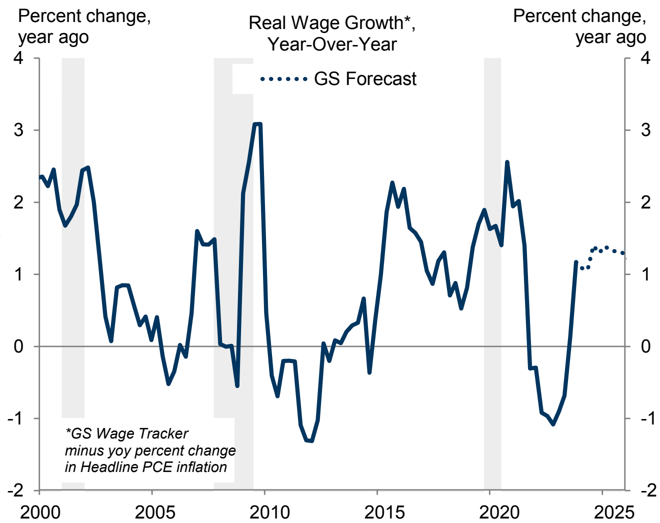
Several of the drivers of income growth in 2023 are likely to repeat in 2024.

The labor market is clearly cooling, with job openings falling and job growth slowing closer to sustainable levels based on the most recent data, but remains tight. We expect that job growth will continue to run comfortably in positive territory and average over 100k/month through the end of 2024 (left chart, Exhibit 3), leaving the unemployment rate stable at 3.5%.

In addition, we expect nominal wage growth will remain fairly elevated—we forecast 3.75% wage growth in 2024 on a Q4/Q4 basis—which combined with falling inflation—we forecast 2.4% headline PCE inflation on a Q4/Q4 basis—should keep real wage growth well above 1% through the end of next year (right chart, Exhibit 3). The combination of continued job gains and positive real wage growth should therefore provide a healthy boost to real income in 2024.

Exhibit 3: Continued Job Gains and Positive Real Wage Growth Should Support Income Gains

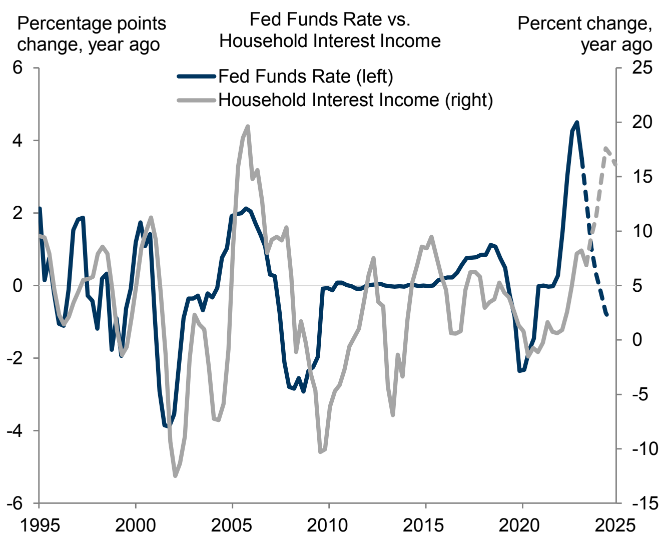


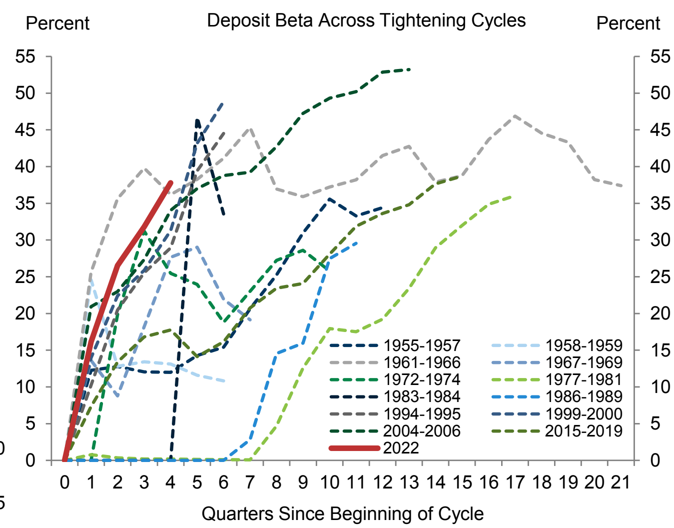


Source: Goldman Sachs Global Investment Research

In addition, the US household sector holds a substantial amount of interest-bearing assets, meaning that interest income should rise as interest rates increase. While there has been a notable increase since the start of the year, interest income has not yet risen by as much as we'd typically expect based on the increase in interest rates (left chart, Exhibit 4), suggesting we have yet to see the full effect of the Fed's rate hikes on household cash flows. This partially reflects that deposit rates have not yet risen by as much as they probably ultimately will based on past hiking cycles (right chart, Exhibit 4). Assuming that interest rates remain elevated, household interest income should increase as yields on interest-bearing assets rise to reflect past rate increases.

Exhibit 4: Interest Income Should Rise Due to Past Interest Rate Increases

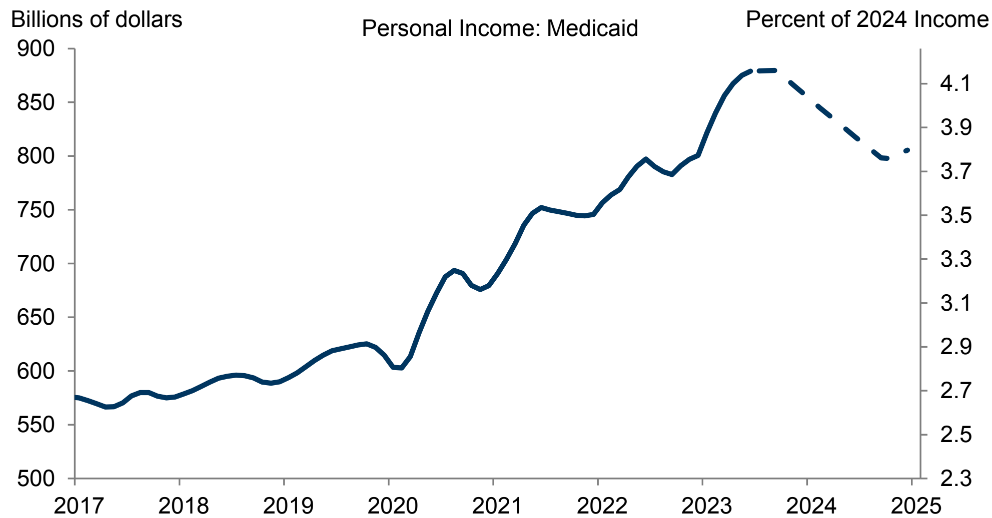




Source: Goldman Sachs Global Investment Research

On the negative side, Medicaid's continuous enrollment provision—which ensured any individual eligible for Medicaid would not lose health insurance coverage as long as the country remained in a public health emergency—came to an end in April, and we have yet to see the pullback in transfer income that we expect as states trim enrollment. It is hard to have much confidence around timing since the trimming of Medicaid rolls will be determined at the state level, but Medicaid spending should trend downwards over the next year and a half, thereby creating a notable headwind to transfer income (Exhibit 5). This income headwind probably has modest read-through to spending, however, since leading academic studies find that Medicaid expansion impacts who pays for healthcare more than it affects actual spending.[1]

Exhibit 5: Transfer Income Faces a Headwind from Medicaid as Pandemic Eligibility Expansion Ends, but the Spending Impact Should Be Modest



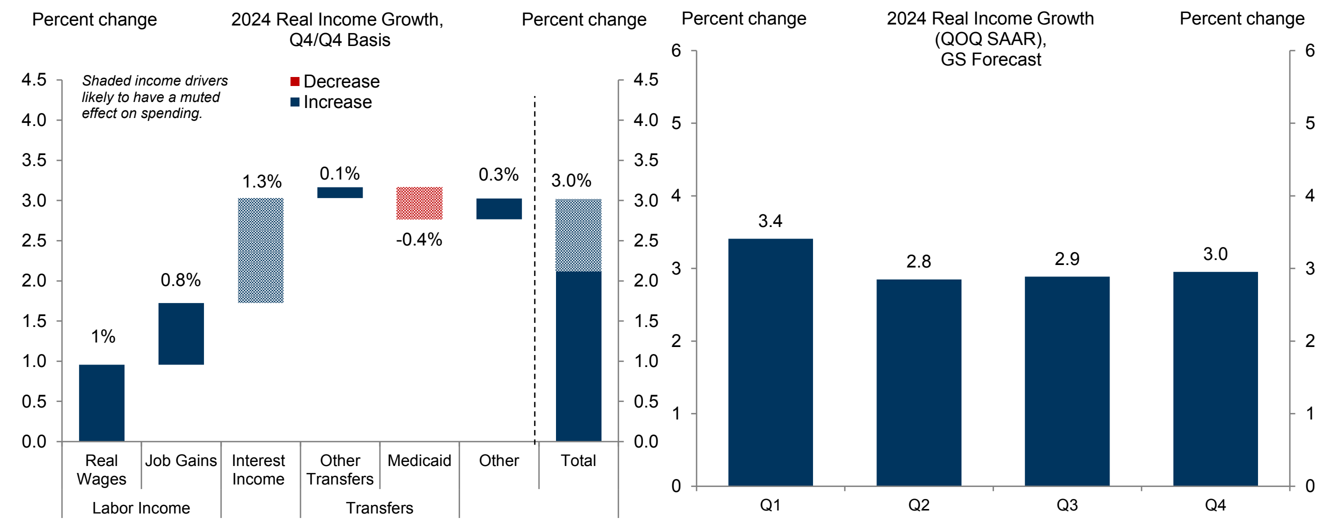
Source: Goldman Sachs Global Investment Research

Forecasting 3% Real Income Growth

After incorporating these drivers into our forecast, we expect real income will grow by 3% in 2024 on a Q4/Q4 basis. In terms of components, expected labor income gains account for over half this increase, we expect interest income increases will raise real income growth by over 1pp, and the pullback in Medicaid coverage is set to subtract almost ½pp (left chart, Exhibit 6). This pace of real income growth is below the 4% pace in 2023, but comfortably above the roughly 2½% real growth pace observed in the 20 years prior to the pandemic. In terms of the timing of these real income gains, we forecast a flatter profile than in 2023, as start-of-year adjustments from COLAs and changes in the effective tax rate will likely be less of a driver of income growth in 2024.

1 Finkelstein, Amy, Nathaniel Hendren, and Erzo FP Luttmer. "The value of Medicaid: Interpreting results from the Oregon health insurance experiment." Journal of Political Economy 127.6 (2019): 2836-2874.

Exhibit 6: We Forecast 3% Real Income Growth in 2024

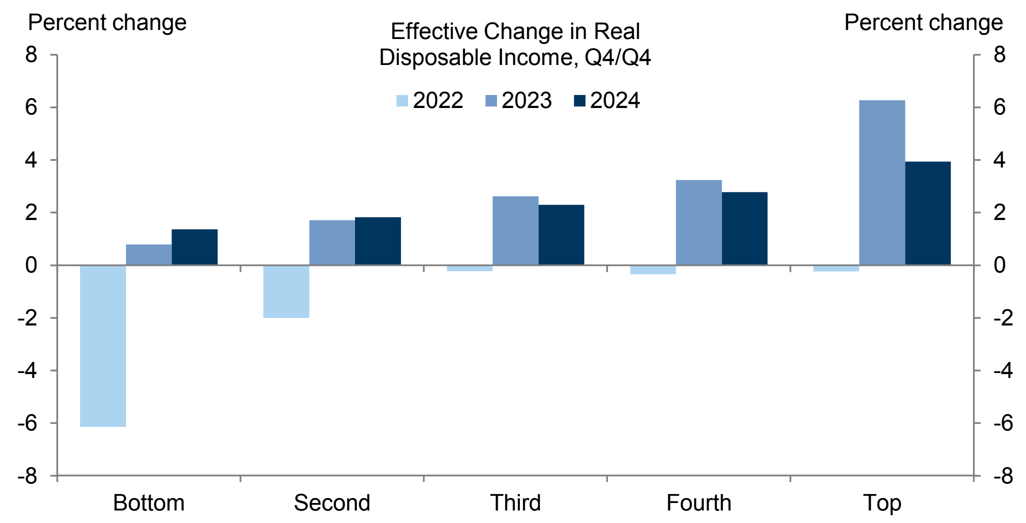


Source: Goldman Sachs Global Investment Research

A 3% pace of real income growth would normally imply 2-3% real spending growth based on the historical relationship between income and spending. However, we suspect the spending response will be somewhat smaller. While the marginal propensity to consume (MPC) from labor income gains is probably fairly high, the MPC from the rise in interest income is probably fairly low, since rising interest income will disproportionately benefit higher-income households that have a lower propensity to spend.

We forecast very firm real income growth of almost 4% for households in the top income quintile (Exhibit 7). We forecast a respectable 1½% real income growth pace for the bottom-income quintile as well, with the slower growth pace partially reflecting the Medicaid headwind. Relative to prior years, we expect that income growth in 2024 will be slightly stronger for lower-income households and slightly weaker for higher-income households than it was in 2023, and much stronger for all households than in 2022.

Exhibit 7: We Expect 2024 Income Growth Will Be Slightly Stronger than in 2023 for Lower-Income Households and Slightly Weaker for Higher-Income Households



Source: Goldman Sachs Global Investment Research

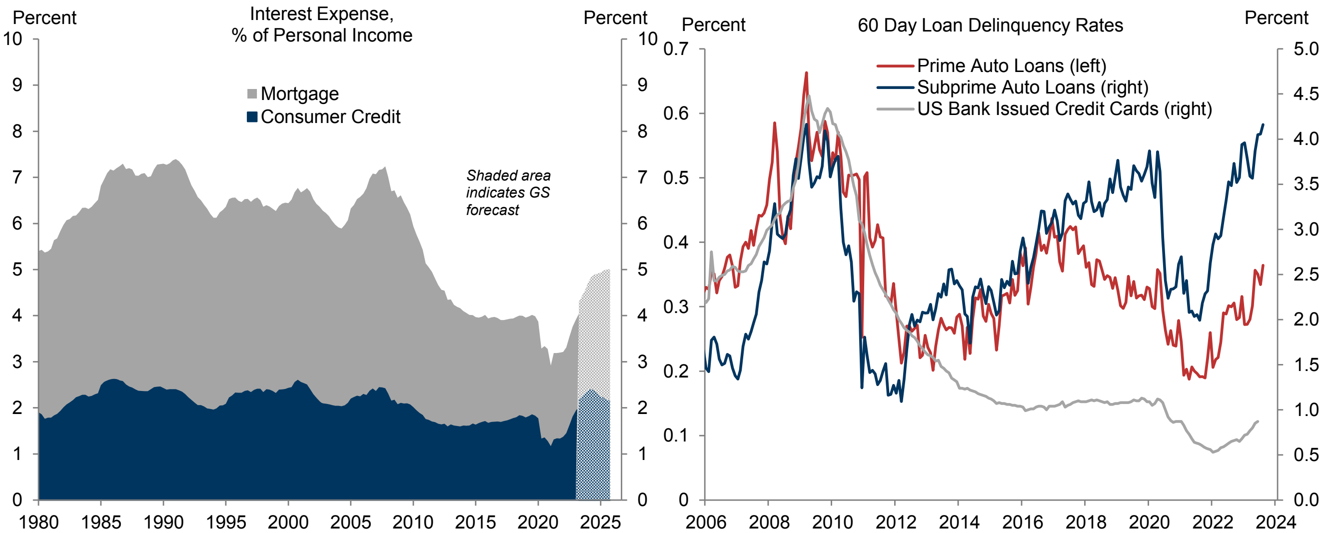
Risks to Income and Spending

We see several other reasons why spending growth could underperform income growth in 2024 by more than it has historically.

First, although the US household sector holds a net long fixed income asset position and rising interest rates should be a positive for cashflow on net, interest expenses are not factored into the BEA's calculation of disposable personal income (nonmortgage interest payments are considered personal outlays and therefore considered in the calculation of personal savings, but one could consider mortgage and nonmortgage interest payments as drags on consumer purchasing power). However, interest expenses should also rise with interest rates, thereby creating an incremental headwind to spending in addition to the moderate drag we anticipate from the restart of student loan payments in 2023Q4. As shown in the left chart of Exhibit 8, we estimate that rising interest expenses could effectively subtract roughly ½pp from income growth through end-2024, with this headwind disproportionately affecting lower-income households.

Indeed, there are a few preliminary signs that rising interest expenses are creating some stress on household finances. Delinquency rates on subprime auto loans—which are primarily held by lower-income borrowers—have overshot their pre-pandemic levels, although delinquency rates on prime auto loans and credit cards—which are held more broadly and therefore more indicative of financial pressures on the broader US consumer—remain below their pre-pandemic levels.

Exhibit 8: We See Some Downside Risk to Spending from Rising Interest Expenses



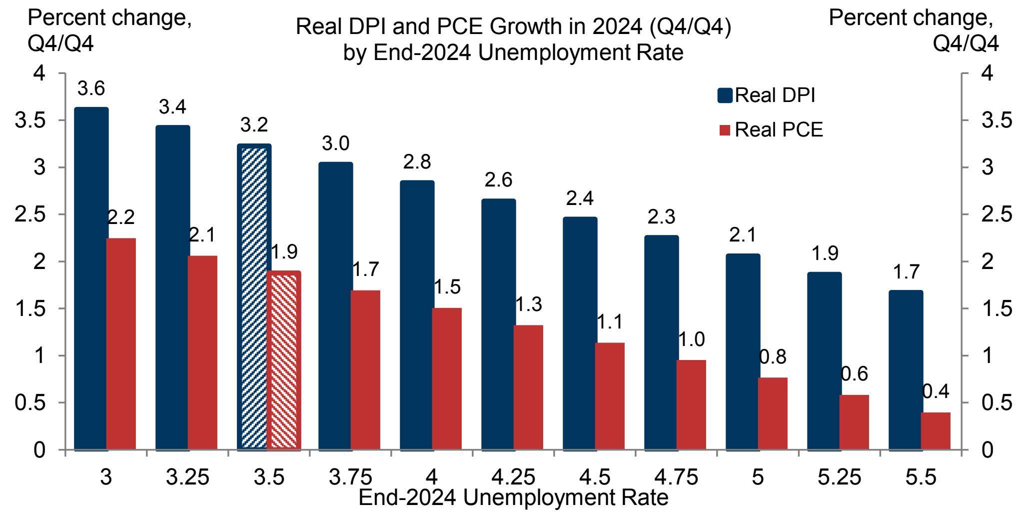
Source: Goldman Sachs Global Investment Research

Second, while household balance sheets remain strong overall, balance sheets of lower-income households have probably weakened over the last year, and we remain skeptical that lower-income households still have a significant financial cushion to support spending growth. Recent evidence from the JP Morgan Chase Institute supports this view, as median cash balances for the lower-income quartile (i.e., households with income under $33k per year) have fallen back to below 115% of their pre-pandemic levels—and likely near or below pre-pandemic levels after adjusting for inflation—from a peak of over 190% in 2021. This drawdown is one reason why we downplay the role of excess savings in the spending outlook, and why we expect that the saving rate will rise from 3.5% today to over 5% by the end of next year.

Third, a key tenet of our relatively positive income growth forecast in 2023 is that the labor market remains tight, leading to continued job and real wage gains. If we are wrong on this forecast and the labor market deteriorates more than we expect, then real income and real spending would likely grow more slowly than we expect.

To quantify this risk, in Exhibit 9 we consider how income and spending growth might evolve under different labor market scenarios. This scenario analysis accounts for the direct hit to income growth from fewer job gains as well as the slower wage growth that we'd expect in a weaker labor market, although it does not fully capture the broader second round effects that could emerge in the event of a more significant labor market deterioration. The key takeaway is that real spending growth will likely run close to or above its potential pace provided that the unemployment rate remains below 4%, and likely remain positive unless the labor market deteriorates much more than we currently anticipate.

Exhibit 9: Income and Spending Growth Are Likely to Remain Fairly Firm Unless the Labor Market Deteriorates More than We Expect



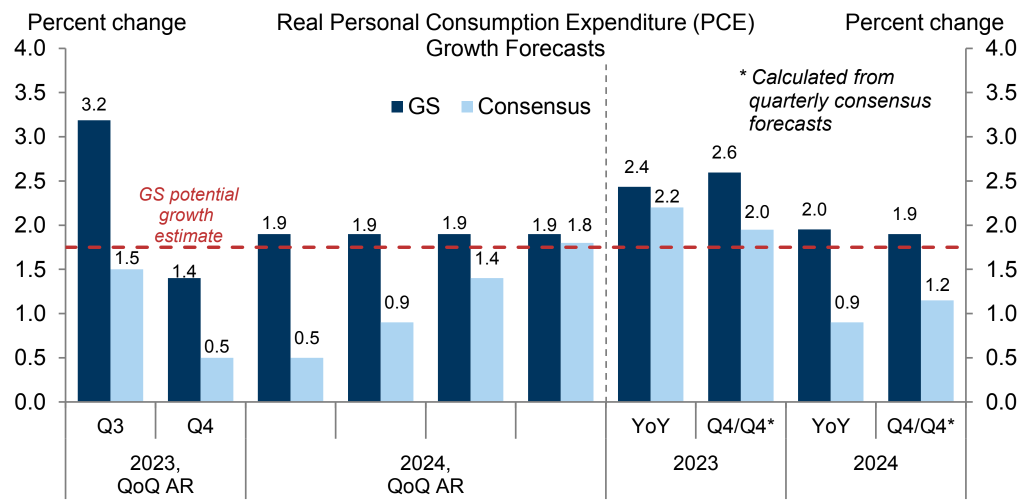
Source: Goldman Sachs Global Investment Research

The 2024 Spending and Growth Outlooks

Taken together, our analysis implies that real income growth will remain a tailwind to real spending growth in 2024—albeit a smaller one than in 2023—provided that job and real wage growth don't significantly underperform our baseline forecasts.

We therefore expect that the US consumer will outperform consensus expectations, and forecast 1.9% real spending growth in 2024 in both yoy (vs. 0.9% Bloomberg consensus) and Q4/Q4 (vs. 1.2%) terms (Exhibit 10). Our forecast for continued outperformance of the US consumer is consistent with our consumer equity team's views, a key reason why we expect that overall GDP growth will outperform consensus expectations in 2024 (1.9% GS forecast Q4/Q4 basis vs. 1.2% Bloomberg consensus), and why we believe that consensus expectations for a US recession in the next 12 months are overstated.

Exhibit 10: We Expect Spending Will Outperform Consensus Forecasts, Grow Above Potential, and Keep Overall Growth Firm



Source: Goldman Sachs Global Investment Research

Joseph Briggs

The US Economic and Financial Outlook

Forecast Changes

THE US ECONOMIC AND FINANCIAL OUTLOOK
(% change on previous period, annualized, except where noted)

	2021	2022	2023	2024	2025	2026	2022		2023				2024			
			(f)	(f)	(f)	(f)	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
OUTPUT AND SPENDING																
Real GDP	5.9	2.1	2.2	1.9	1.9	1.9	3.2	2.6	2.0	2.1	2.9	1.3	1.9	1.9	1.9	1.9
Real GDP (annual=Q4/Q4, quarterly=yoy)	5.7	0.9	2.1	1.9	1.9	1.9	1.9	0.9	1.8	2.5	2.4	2.1	2.0	2.0	1.7	1.9
Consumer Expenditures	8.3	2.7	2.4	2.0	1.9	1.9	2.3	1.0	4.2	1.7	3.2	1.4	1.9	1.9	1.9	1.9
Residential Fixed Investment	10.7	-10.6	-10.3	4.1	3.2	3.0	-27.1	-25.1	-4.0	-3.6	13.7	2.5	3.5	3.5	3.5	3.5
Business Fixed Investment	6.4	3.9	3.1	3.3	3.6	3.6	6.2	4.0	0.6	6.2	0.9	3.5	3.4	3.1	3.7	3.9
Structures	-6.4	-6.6	7.3	2.0	2.8	3.0	-3.6	15.7	15.8	11.3	-1.4	2.0	1.5	1.5	2.5	2.5
Equipment	10.3	4.3	0.0	4.1	3.2	3.0	10.6	-3.5	-8.9	7.7	1.0	6.0	5.0	2.5	3.5	4.0
Intellectual Property Products	9.7	8.8	4.1	3.2	4.5	4.5	6.8	6.2	3.1	2.2	2.0	2.0	3.0	4.5	4.5	4.5
Federal Government	2.3	-2.5	3.1	0.1	0.0	0.0	3.7	5.8	6.0	1.2	0.5	0.0	0.0	0.0	0.0	0.0
State & Local Government	-0.5	0.7	2.9	0.5	0.9	1.0	3.7	2.6	4.4	4.6	0.4	0.0	0.0	0.1	0.9	0.9
Net Exports ($bn, '12)	-1,233	-1,357	-1,227	-1,289	-1,324	-1,343	-1,269	-1,239	-1,208	-1,212	-1,238	-1,252	-1,267	-1,281	-1,296	-1,312
Inventory Investment ($bn, '12)	-19	125	9	45	60	60	39	137	4	-2	21	15	30	40	50	60
Industrial Production, Mfg.	4.9	2.7	0.0	2.8	3.3	3.3	0.0	-3.3	-0.4	0.0	2.9	2.5	3.1	3.0	3.2	3.4
HOUSING MARKET																
Housing Starts (units, thous)	1,606	1,551	1,423	1,539	1,539	1,539	1,446	1,405	1,385	1,443	1,425	1,437	1,539	1,539	1,539	1,539
New Home Sales (units, thous)	769	637	693	713	716	716	583	598	638	689	725	721	713	710	714	716
Existing Home Sales (units, thous)	6,128	5,081	4,360	4,750	4,995	5,026	4,777	4,197	4,327	4,250	4,371	4,492	4,614	4,709	4,804	4,872
Case-Shiller Home Prices (%yoy)*	19.0	7.4	1.3	1.7	2.4	3.8	13.1	7.4	2.2	-1.1	-0.3	1.3	1.9	1.4	1.6	1.7
INFLATION (% ch, yr/yr)																
Consumer Price Index (CPI)**	7.2	6.4	3.2	3.0	2.4	2.4	8.3	7.1	5.8	4.1	3.4	3.1	3.0	3.0	2.8	2.9
Core CPI **	5.5	5.7	3.8	3.0	2.5	2.5	6.3	6.0	5.6	5.2	4.3	3.9	3.6	3.1	3.2	3.0
Core PCE** †	5.0	4.6	3.4	2.4	2.2	2.1	4.9	4.8	4.7	4.4	3.9	3.5	2.9	2.6	2.6	2.4
LABOR MARKET																
Unemployment Rate (%)^	3.9	3.5	3.6	3.6	3.6	3.6	3.5	3.5	3.5	3.6	3.7	3.6	3.6	3.6	3.6	3.6
U6 Underemployment Rate (%)^	7.3	6.5	6.9	6.9	6.9	6.8	6.8	6.5	6.7	6.9	7.1	6.9	6.9	6.9	6.9	6.9
Payrolls (thous, monthly rate)	606	399	205	103	80	78	423	284	312	201	165	142	112	100	100	100
Employment-Population Ratio (%)^	59.5	60.1	60.5	60.4	60.2	60.0	60.1	60.1	60.4	60.3	60.4	60.5	60.5	60.4	60.4	60.4
Labor Force Participation Rate (%)^	62.0	62.3	62.8	62.7	62.5	62.5	62.3	62.3	62.6	62.6	62.8	62.8	62.7	62.7	62.7	62.7
Average Hourly Earnings (%yoy)	4.2	5.3	4.3	3.9	3.6	3.6	5.3	4.9	4.5	4.4	4.2	4.1	4.1	3.9	3.8	3.7
GOVERNMENT FINANCE																
Federal Budget (FY, $bn)	-2,775	-1,375	-1,700	-1,650	-1,800	-1,800	--	--	--	--	--	--	--	--	--	--
FINANCIAL INDICATORS																
FF Target Range (Bottom-Top, %)^	0-0.25	4.25-4.5	5.25-5.5	4.5-4.75	3.5-3.75	3-3.25	3-3.25	4.25-4.5	4.75-5	5-5.25	5.25-5.5	5.25-5.5	5.25-5.5	5-5.25	4.75-5	4.5-4.75
10-Year Treasury Note^	1.52	3.88	3.90	3.75	3.75	3.75	3.83	3.88	3.48	3.81	3.90	3.90	3.80	3.75	3.75	3.75
Euro (€/$)^	1.13	1.07	1.07	1.15	1.15	1.15	0.98	1.07	1.09	1.09	1.08	1.07	1.10	1.11	1.12	1.15
Yen ($/¥)^	115	132	150	135	135	135	145	132	133	144	146	150	155	153	150	135

* Weighted average of metro-level HPIs for 381 metro cities where the weights are dollar values of housing stock reported in the American Community Survey. Annual numbers are Q4/Q4.
** Annual inflation numbers are December year-on-year values. Quarterly values are Q4/Q4.
† PCE = Personal consumption expenditures. ^ Denotes end of period.
Note: Published figures in bold.
Source: Goldman Sachs Global Investment Research.

Source: Goldman Sachs Global Investment Research

Disclosure Appendix

Reg AC

We, Jan Hatzius, Alec Phillips, David Mericle, Spencer Hill, CFA, Ronnie Walker, Tim Krupa, Manuel Abecasis and Joseph Briggs, 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 Global Investment Research 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. Investment in securities market are subject to market risks. Read all the related documents carefully before investing. Registration granted by SEBI and certification from NISM in no way guarantee performance of the intermediary or provide any assurance of returns to investors. Goldman Sachs (India) Securities Private Limited Investor Grievance E-mail: india-client-support@gs.com. Compliance Officer: Anil Rajput |Tel: + 91 22 6616 9000 | Email: anil.m.rajput@gs.com. **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)

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 Goldman Sachs Global Investment Research 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.