US Economics Analyst

The Case for Declining Core Inflation (Hill)

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

Joseph Briggs
+1(212)902-2163 |
joseph.briggs@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

- Core inflation stopped falling in the first half of the year, and the FOMC now projects the core PCE measure to end the year at nearly double its 2% target. However, we see four reasons to expect renewed declines in inflation this summer and beyond: 1) the 9% pullback in used car auction prices that we believe is only halfway done, 2) negative residual seasonality in the summer for CPI and PCE prices, 3) the sharp deceleration in apartment rent list prices and diminished upward pressure from lease renewals, and 4) significant progress on labor market rebalancing.
- Used car prices surprised to the upside in the first half of the year due to China's Covid wave and a lull in global microchip production. But looking ahead, the three strongest predictors of used car prices—new vehicle inventories, new vehicle incentives, and the new-versus-used price differential—all point to significant declines. Used car auction prices have already pulled back 9%, and our model suggests another 9% drop this summer and fall. And importantly, these declines will *begin* flowing through to consumer prices with the June CPI data in two weeks.
- The second reason to expect lower inflation this summer is residual seasonality. We find that both the CPI and PCE seasonal factors are spuriously fitting to the sharp in rebound in travel and transportation categories in mid-2020, following the end of the initial Covid lockdowns. We estimate seasonal headwinds of 10-15bp (mom sa) in both of the next two core CPI readings (June and July) and of 5bp in each of the next three core PCE readings (June, July, and August).[1]
- We also continue to expect a further decline in shelter inflation. The best alternative rent measures have slowed from a +20% annualized pace in mid-2021 to just over +1% annualized in last 8 months. Additionally, Cleveland Fed research and our own analysis using alternative rent data reveal that at least half of the post-pandemic premium on new rental units has unwound—which will reduce upward pressure on lease renewals. These findings validate the spring stepdown in monthly shelter inflation and argue for additional slowing in coming quarters.

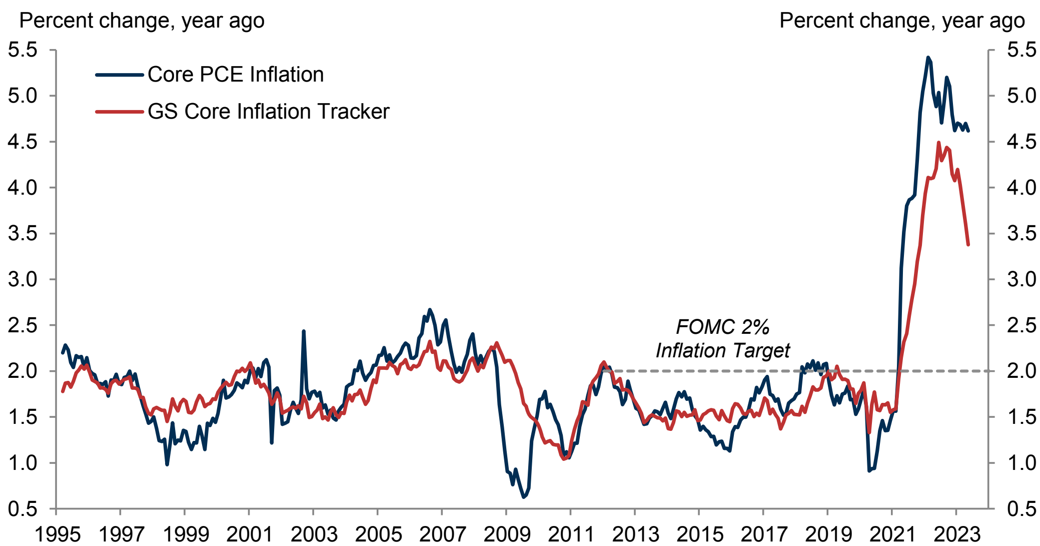
[1] Uncertainty around the magnitude of the PCE price bias is higher, because the BEA statistics can choose whether or not to use the CPI seasonal factors and because their own seasonal adjustment approach (contemporaneous seasonal adjustment) is relatively more likely to revise away some of the residual seasonality with each subsequent year of data.

- The final reason to expect lower inflation readings is also the most durable: the significant progress on labor market rebalancing. Our jobs-workers gap has roughly halved, and sequential growth in average hourly earnings has already slowed to the 4% pace we believe is necessary to bring medium-term inflation back into the Fed's comfort zone. The normalization of commodity prices and inflation expectations—both beneficiaries of the more balanced labor market—also argue for a slower pace of inflation. We find that these four variables can explain all of the 2023 pullback in non-housing services inflation excluding the (lagging and idiosyncratic) healthcare and financial services categories—and they argue for further moderation ahead.
- We are lowering our December 2023 core PCE inflation forecast by two tenths to 3.5% year-on-year, and we are now assuming a sizable slowdown in June for both core CPI (0.24% vs. 0.44% in May, mom sa) and core PCE (0.21% vs. 0.31%). Such an outcome would validate the Fed's plan of slowing the pace of monetary tightening and would further reduce the odds of back-to-back hikes in July and September, in our view.

The Case for Declining Core Inflation

Disinflation appeared to pause during the spring, with year-on-year core PCE inflation stabilizing in a 4.6-4.7% range after falling ¾pp over the previous year (see blue line in Exhibit 1).

Exhibit 1: Core PCE Inflation Stopped Falling in the First Half of the Year, but Underlying Disinflation Has Continued



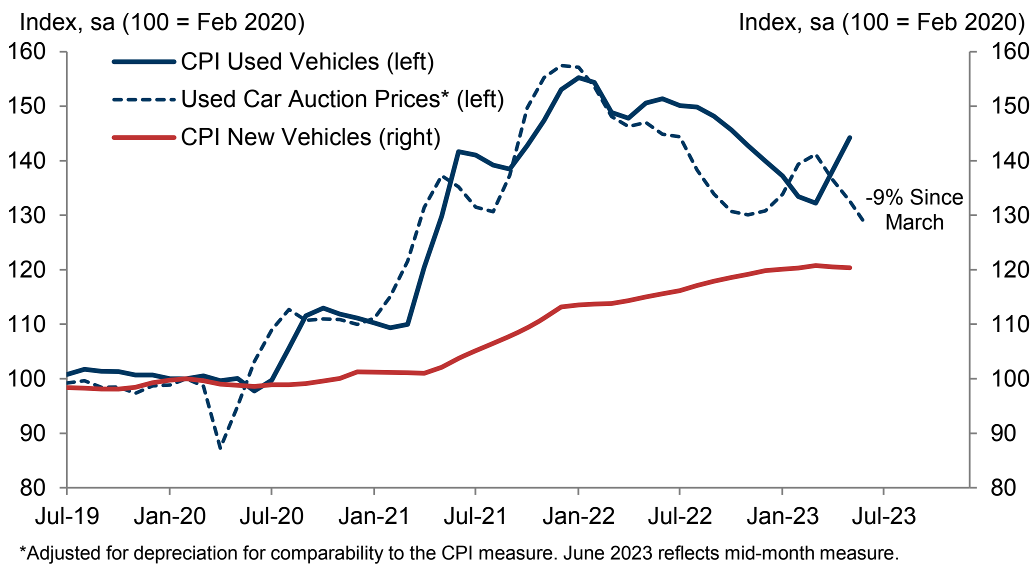
Source: Department of Commerce, Goldman Sachs Global Investment Research

In contrast, trimmed measures have continued to make gradual progress, and our Core Inflation Tracker—which we developed in 2019 to extract the underlying trend in core inflation—is now consistent with a 3.4% trend pace (see red line in the same exhibit). In this edition of the *Analyst*, we make the case for renewed declines in core inflation this summer and beyond, based on four drivers: 1) the 9% pullback in used car auction prices that we expect to continue, 2) negative residual seasonality for both CPI and PCE prices in the summer, 3) the sharp deceleration in apartment rent list prices and diminished upward pressure from lease renewals, and 4) significant progress on labor-market rebalancing.

Renewed Declines in Used Car Prices

Used car prices surprised to the upside in the first half of the year, driven by a pullback in vehicle supply caused by fewer lease expirations and rental car fleet dispositions and by yet another bout of supply chain disruptions—this one related to China's Covid wave and a lull in global microchip production. Looking ahead however, wholesale auction prices—a strong leading indicator of consumer prices—have already fallen 9% peak-to-trough through mid-June (see Exhibit 2).

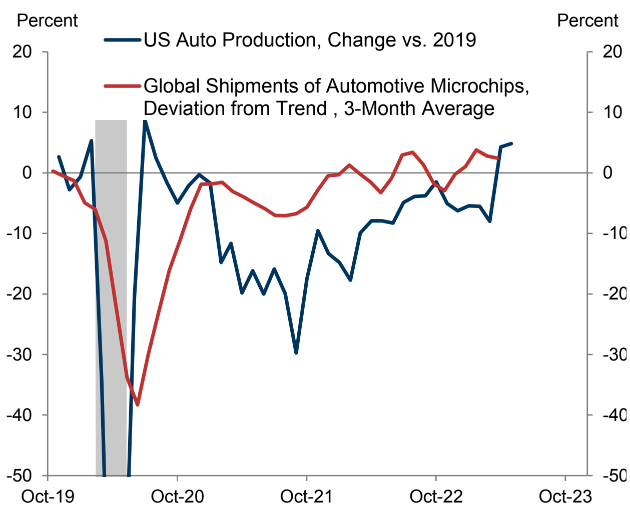
Exhibit 2: Used Car Auction Prices Have Already Pulled Back Sharply and Will Begin Weighing on Consumer Prices in June

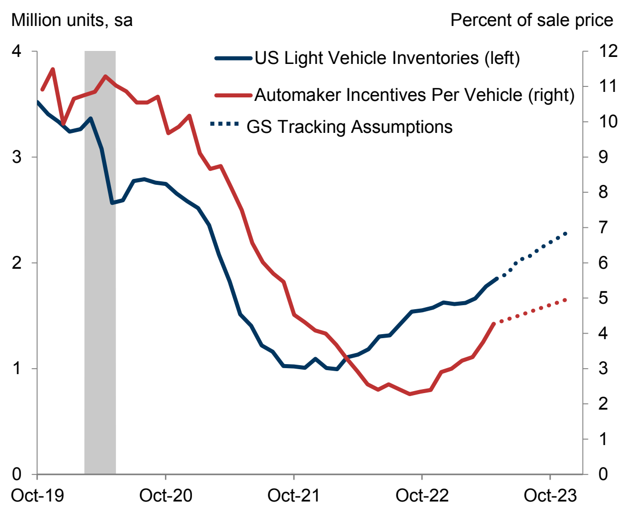


Source: Department of Labor, Manheim, Goldman Sachs Global Investment Research

We believe this pullback largely reflected a return to pre-pandemic auto production over the last two months, itself made possible by a normalization in microchip availability (see left panel of Exhibit 3).[2]

Exhibit 3: Normalized Microchip Supply Has Allowed Car Production to Rise Above Pre-Pandemic Levels, In Turn Boosting Auto Inventories and Bringing Back Dealer Discounts





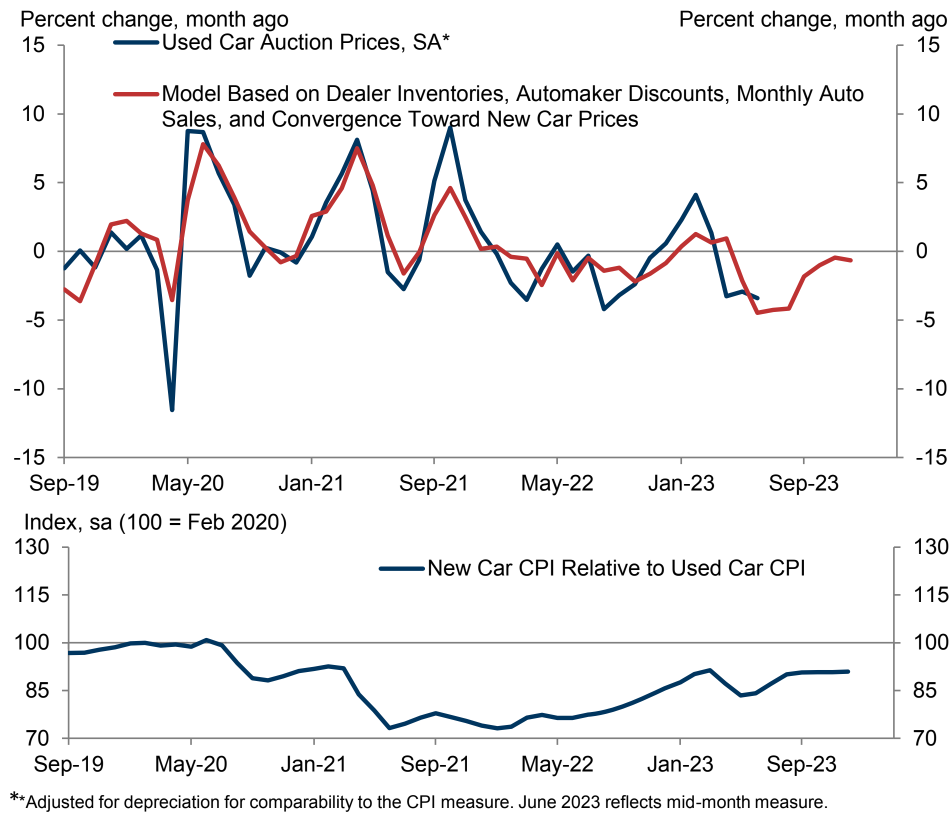
Source: Federal Reserve, Autodata, Goldman Sachs Global Investment Research

Auto industry fundamentals argue for additional declines in used car auction prices in the second half of the year. Both our auto analysts and automaker production schedules expect the recent rebound in vehicle production to be sustained (at 10-11mn annualized), which would contribute to a further rebuild of dealer inventories and a further normalization in discounts on new cars (see dotted line of right panel).

[2] The reopening of the Chinese economy also likely contributed.

In Exhibit 4, we model month-over-month used car auction prices based on the above variables as well as the ratio of new car prices to used car prices.[3] We find that new vehicle fundamentals explain most of the variation in used car auction prices, with new vehicle inventories, new vehicle incentives, and the new-used price differential particularly important.[4] All three of these factors argue for further declines in used car prices in the back half of the year. As shown in Exhibit 4, our model estimates an 18% peak-to-trough decline in auction prices this year—or roughly double the declines already realized.[5]

Exhibit 4: Supply Chain Normalization and Still-Elevated Used Car Prices Argue for Further Declines in the Second Half of the Year



Source: Manheim, Department of Labor, Goldman Sachs Global Investment Research

Importantly, none of these auction price declines have flowed through to the CPI or PCE measures because of the lag between wholesale and consumer prices. Reflecting these findings, we are lowering our used car inflation forecast by 4pp to -11% year-on-year in December 2023. This assumes 14% downside from current levels and would lower year-on-year core PCE inflation by 0.1pp and core CPI inflation by 0.2pp, relative to the

[3] We model auction prices as opposed to consumer prices, because the former are source data for the latter, and the latter suffer from issues related to changing methodologies and residual seasonality. We exclude lags of auction prices because we are interested forecasting the multi-quarter path based on the information in hand today.

[4] We find a smaller role for new car and used car unit sales (demand).

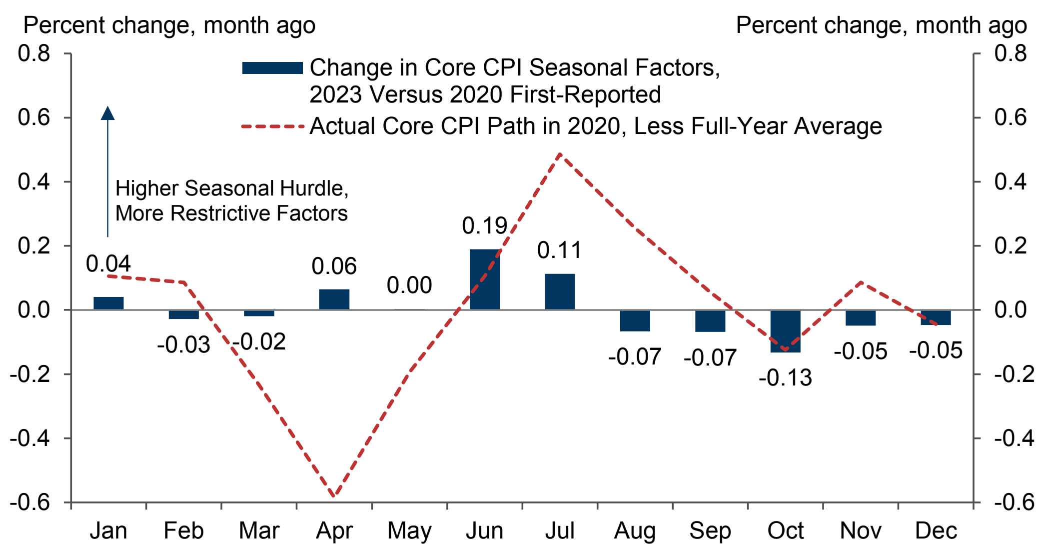
[5] We also estimate a model that includes the flow of used car supply from expiring leases and rental car company fleet dispositions. This model indicated a more moderate decline in used car auction prices (-12% peak-to-trough in 2023, compared to -18% for our baseline model). However, the coefficient on used car supply is not statistically significant, and we place more weight on the model shown.

pace in May.

Residual Seasonality Headwinds

The second reason to expect lower inflation this summer is residual seasonality. We believe both the CPI and PCE seasonal factors are spuriously fitting to the post-lockdown price rebounds of mid-2020, for example in autos, hotel lodging, and airfares. In Exhibit 5, we plot the change in the core CPI seasonal factors for 2023 relative to the initial vintages in 2020—the latter of which were estimated prior to the pandemic and are free from the associated distortions. On this basis, the seasonal hurdle for June has become 19 basis points more restrictive. Put another way, the evolution of the June seasonal factor will depress the upcoming core CPI reading by a whopping 0.19pp (mom sa) unless the actual seasonality of prices has evolved as well.

Exhibit 5: The CPI Seasonal Factors Appear to Be Fitting to the Post-Lockdown Price Rebound of Summer 2020; This Argues for Softer Core CPI Readings in June and July

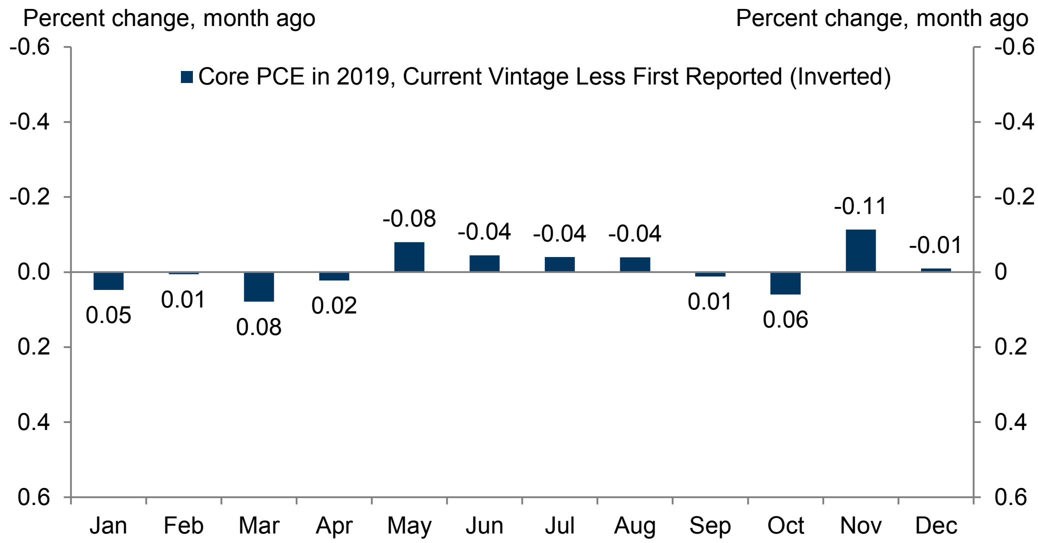


Source: Department of Labor, Goldman Sachs Global Investment Research

The same analysis argues for a seasonality headwind of as much as 10 basis points in the July reading (reported August 10). We see these as upper bounds for the magnitude of the bias, because the seasonal may have genuinely evolved in a few categories, such as apparel and used cars. Looking ahead to the fall, this exercise cautions that we may see a upwardly biased core CPI readings, with the seasonal hurdle evolving more restrictive by seven basis points on average for the August to December period.

Many of the affected CPI components are also source data for the PCE indices, including autos, hotel lodging, and apparel. And while the BEA does not publish the monthly seasonal factors for PCE prices, the pattern of revisions since 2019 is also consistent with a negative bias from residual seasonality this summer (see Exhibit 6).

Exhibit 6: We Also Expect Residual Seasonality to Weigh on Core PCE Readings This Summer



Source: Department of Commerce, Goldman Sachs Global Investment Research

Taken together, we assume a seasonal headwind of 0.1-0.15pp for core CPI inflation in both June and July (mom sa) and a seasonal headwind of 0.05pp for core PCE inflation each in June, July, and August.[6] Reflecting this and expected weakness in autos, for the month of June we are penciling in a sizeable slowdown for both core CPI (0.24% vs. 0.44% in May) and core PCE (0.21% vs. 0.31% for May).[7]

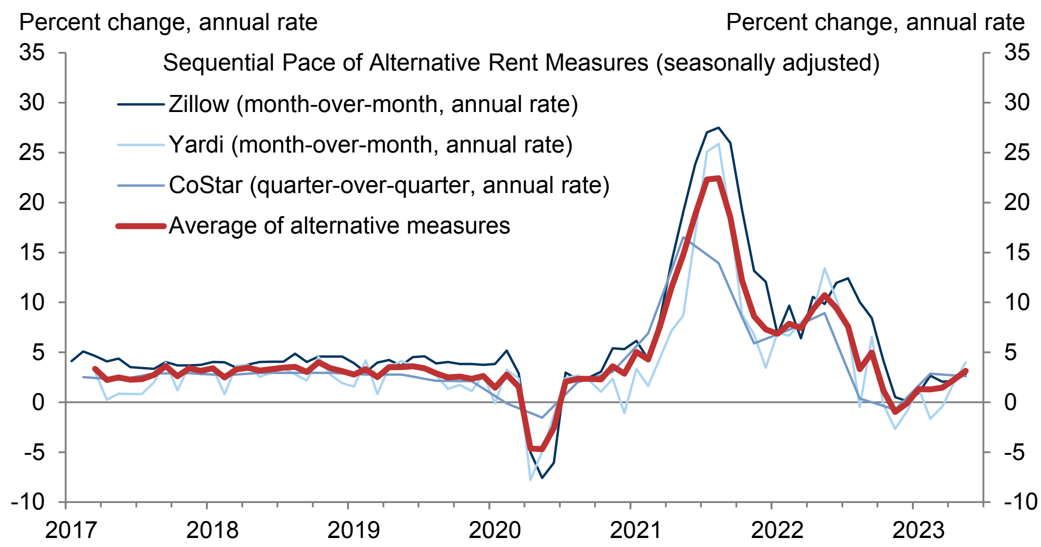
A Further Gradual Decline in Shelter Inflation

We also continue to expect a further decline in shelter inflation—on both a sequential and year-on-year basis. As shown in Exhibit 7, the most accurate and timely online rent measures have slowed from an eyepopping +20% annualized pace in mid-2021 and a still elevated +9% annualized pace during 2021-2022 to just +1% over the last 8 months.

[6] Uncertainty around the magnitude of the PCE price bias is higher, because the BEA statisticians can choose whether or not to use the CPI seasonal factors and because their own seasonal adjustment approach (contemporaneous seasonal adjustment) is more likely to revise away some of the residual seasonality with each subsequent year of data.

[7] We will update our estimates in the second week of July to reflect the nowcast information set.

Exhibit 7: Rent Growth for New Tenants Has Slowed Sharply

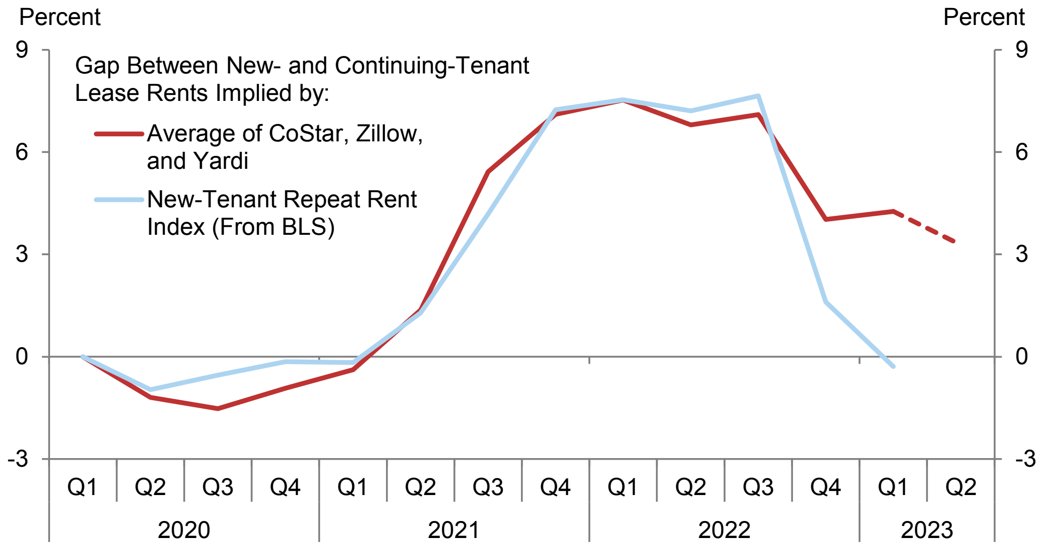


Source: CoStar, Zillow, Yardi, Goldman Sachs Global Investment Research

As discussed in more detail here, we believe this overstates the softening we should expect in CPI and PCE shelter inflation, because of continued upward pressure on lease renewals for existing tenants. However, it nonetheless validates the stepdown in monthly shelter inflation over the last three months and argues for additional slowing in coming quarters.

And from the perspective of lease renewals, both the Cleveland Fed's decomposition of the CPI shelter sample and our own analysis combining official data with the alternative measures suggest that over half of the premium on new rental units that developed during the pandemic has closed.

Exhibit 8: Over Half of the Pandemic Rent Gap Between New and Existing Tenants Has Already Closed, Implying Less Upward Pressure on Lease Renewals



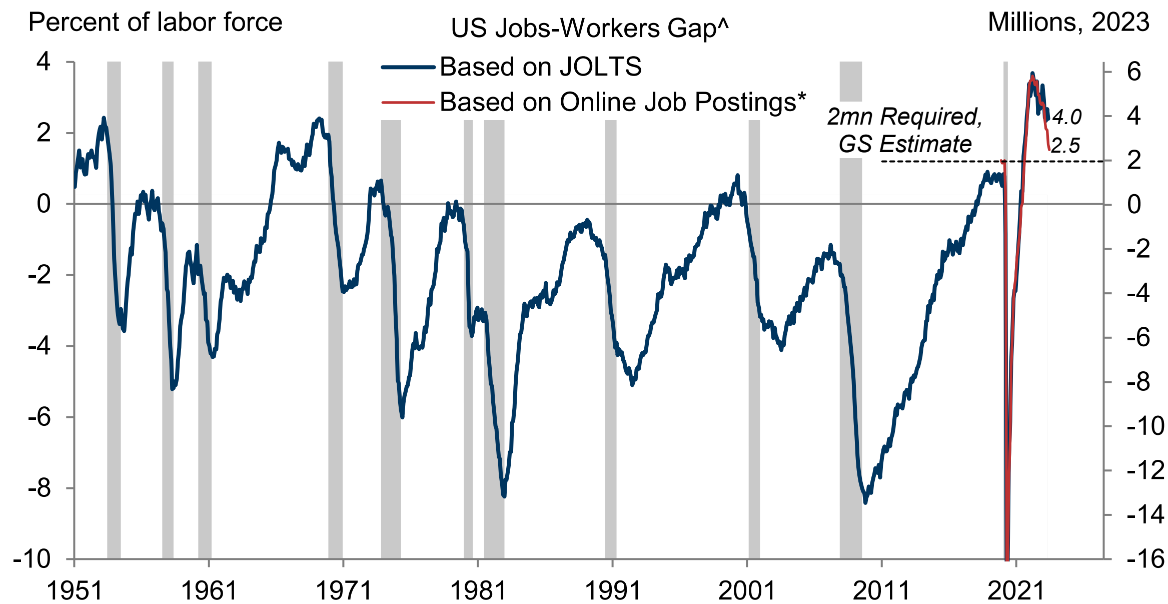
Source: Department of Labor, Federal Reserve, Goldman Sachs Global Investment Research

We expect shelter inflation to slow further to a +5% annualized rate by December 2023 (or +0.41% mom sa), down from the peak monthly annualized rate of over 10% (+0.82%) in late 2022.

The Fruits of Labor Market Rebalancing

The final reason to expect lower inflation readings in the back half the year is also the most durable: the significant progress already achieved on labor market rebalancing. As shown in Exhibit 9, the jobs-workers gap—our preferred summary measure of labor market slack—has already declined from the record peak of 6.1mn last spring (3.7% of the labor force) to 4.0mn, based on the official JOLTS job openings measure.

Exhibit 9: The Labor Market Has Cooled Significantly Over the Last Year but Remains Tighter than Normal



^ Difference between the number of job openings in the prior month and unemployed workers in the current month.

* Measures from LinkUp and Indeed, scaled to JOLTS job openings.

Note: NBER recessions shaded.

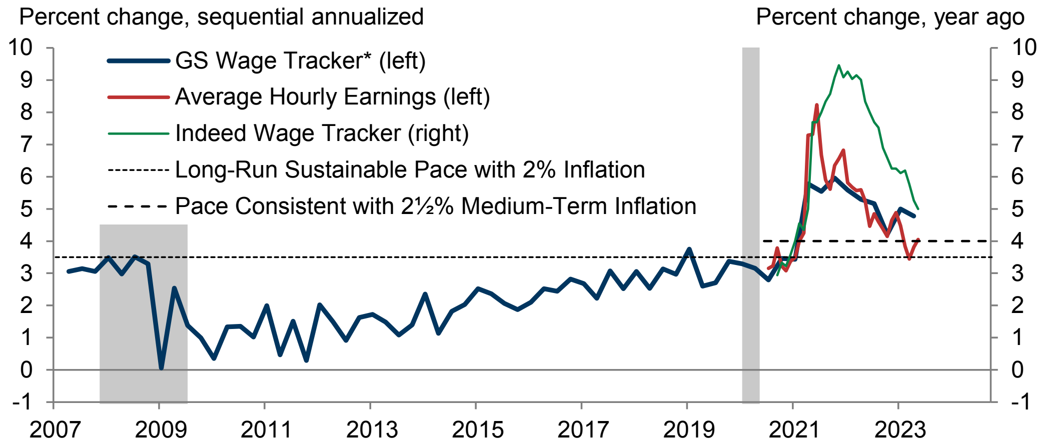
Source: Department of Labor

As we explore here, the JOLTS measure is based on a relatively small sample with a low and likely biased response rate. And as shown by the red line in the same exhibit, the jobs-workers gap has fallen considerably further to 2.5mn workers based on online job postings data, which track vacancies across a much larger and probably more representative sample of firms.

Either way, the above represents significant progress toward the 2mn excess jobs we believe is required for wage growth to stabilize at 3.5%-4%—which would in turn allow core inflation to stabilize at 2-2.5% over the medium term (for more details see here, here, here).

This rebalancing has already helped catalyze a significant decline in wage growth. As shown by the blue line in Exhibit 10, the sequential pace of our GS Wage Tracker has fallen by a full point to 4.5-5%. The more timely average hourly earnings wage series is already running at 4%, which is the high-end of the pace required to bring medium-term inflation back into the Fed's comfort zone. Leading indicators of wage growth also suggest continued progress, including our wage surveys (see here) and wages advertised in online job postings (see green line of the same Exhibit).

Exhibit 10: Wage Growth Has Peaked and Is Approaching Acceptable Levels from the Standpoint of Price Stability

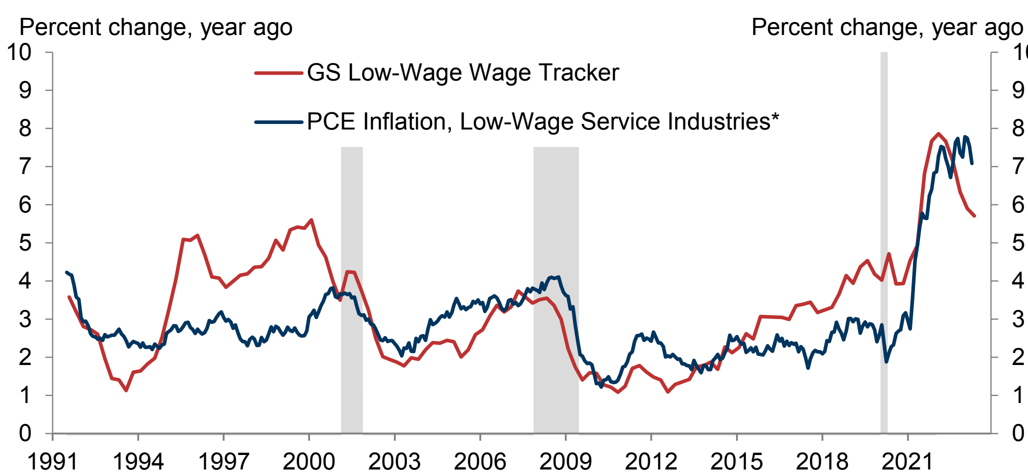


* Our sequential wage tracker is the first principal component of average hourly earnings for private industry workers, the Employment Cost Index, and hourly compensation in the nonfarm business sector.
Note: First two series are adjusted for changes in the composition of the labor force between 2020Q1 and 2022Q3.

Source: Department of Labor, Indeed, Goldman Sachs Global Investment Research

Post-pandemic labor shortages have been particularly severe among lower-paid, lesser skilled positions, exerting upward pressure on wage growth for the bottom half of the income distribution and on inflation for labor-sensitive services categories. Accordingly, and as shown in Exhibit 11, the 2pp pullback in our Low-Wage Wage Tracker is particularly encouraging for the medium-term inflation outlook.

Exhibit 11: Wage Growth Is Falling More Quickly Among Low-Wage Workers

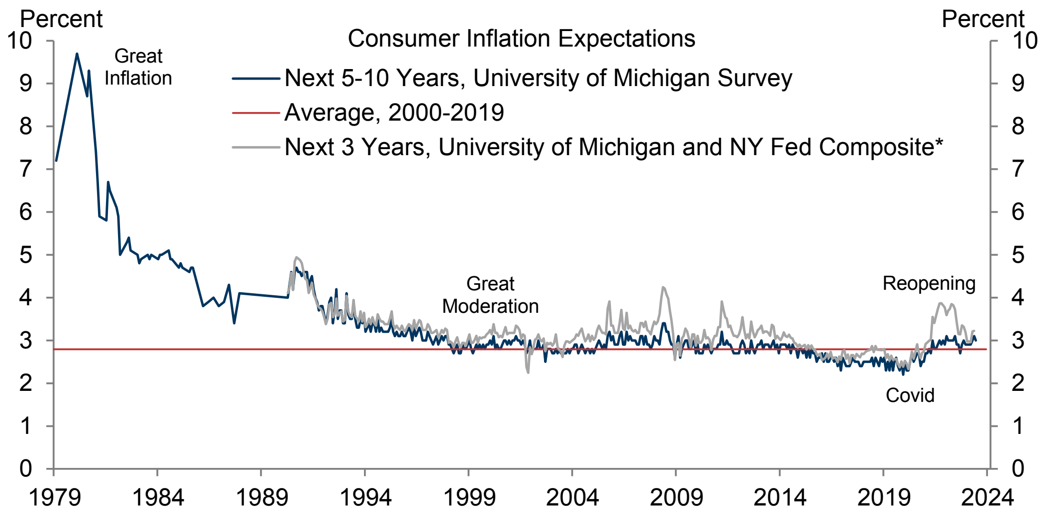


* Includes food services, hotels and casinos, other recreational services, nursing homes, motor vehicle services, personal services, social services, household maintenance.

Source: Department of Commerce, Goldman Sachs Global Investment Research

The normalization of commodity prices and inflation expectations also argue for a slower pace of inflation, other things equal. In Exhibit 12, we plot consumer surveys of long-term inflation expectations and of a composite of 3-year inflation expectations. These measures rose to potentially worrisome levels in 2022 but subsequently normalized.

Exhibit 12: Near-Term Inflation Expectations Have Normalized and Long-Term Inflation Expectations Remain Anchored

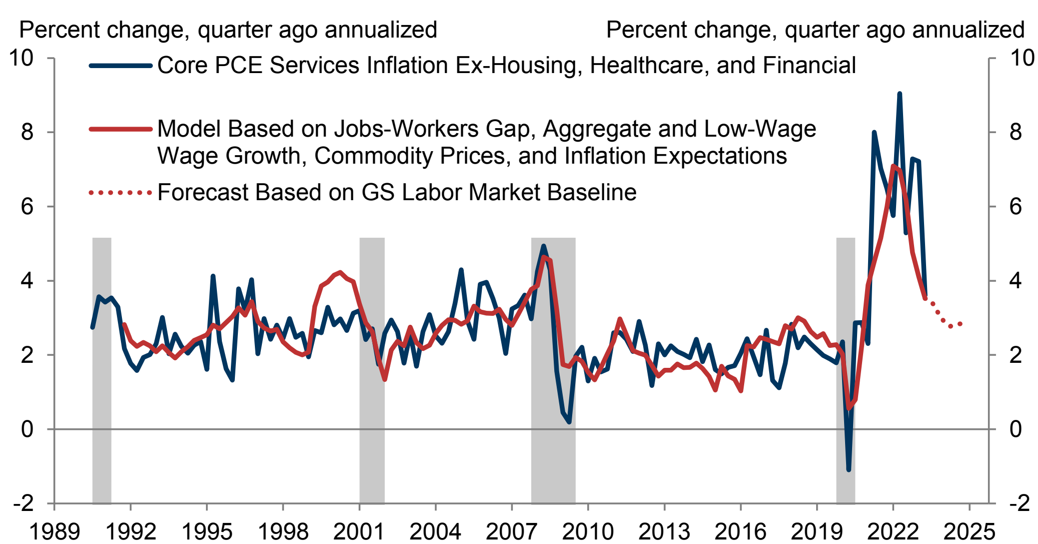


*Average of UMich and NY Fed measure (where available). UMich measure uses 5-10 year expectations as estimates for years 2 and 3.

Source: University of Michigan, Federal Reserve, Goldman Sachs Global Investment Research

What do these developments imply for the inflation outlook? In Exhibit 13, we explore the forecasting power of falling wage growth, job vacancy rates, inflation expectations, and commodity prices for services inflation. We focus on core services categories excluding housing and also healthcare—which exhibits longer lags and pandemic-related idiosyncrasies. We also exclude financial services, which depends in large part on asset prices and is less directly sensitive to the labor market. As shown in Exhibit 13, we find significant forecasting power, with these variables explaining 60% of the variation in quarter-over-quarter price changes (we do not include lags of inflation itself).

Exhibit 13: Labor Market Rebalancing, Lower Commodity Prices, and Lower Inflation Expectations Explain the Recent Pullback in Inflation in Many Services Categories—and Indicate More to Come



Source: Department of Commerce, Goldman Sachs Global Investment Research

Furthermore, we find that the favorable evolution of these variables can explain all of the net slowing in services inflation across these categories (see the recent pullback in both the solid red and solid blue lines in 2023). Looking ahead, the continued rebalancing of the labor market and the further slowing in wage growth that we expect[8] argue for some additional moderation in the pace of services inflation across these categories (see dotted line).

We forecast inflation for the broader "core services ex-housing" segment to fall from 4.5% year-on-year currently to 4.1% in December, a smaller decline than suggested by the previous model because of the relatively firmer outlook in healthcare (for which cost pressures affect prices with a much longer lag) and financial services (due to higher asset prices)— and also because the model has been surprised to the upside on net in recent quarters. Ultimately, while these top-down variables are informative for the inflation outlook, there remains substantial noise and idiosyncrasy in the core inflation statistics. This argues for humility in medium-term forecasting, even when the key drivers are moving in the right direction.

Inflation Outlook and Fed Implications

We are lowering our December 2023 core PCE forecast by two tenths to 3.5% (from 3.7% previously). Our forecast for Q4 as a whole is now two tenths below consensus of 3.8%, despite the pickup we expect in healthcare and financial services. We are leaving our December 2024 forecast unchanged at 2.4% (see Appendix for component-level forecasts). We are also lowering our December 2023 core CPI forecast by three tenths to 3.9% year-on-year, a slightly larger downgrade reflecting the larger weight of used cars in the CPI measure.

From the Fed's perspective, another 1.1pp decline in core PCE between now and year-end would represent a ~0.3pp downside surprise relative to the projections in the June SEP. We believe such an outcome would further decrease the risk that inflation expectations de-anchor to the upside and would increase the Fed's conviction that price stability can be reestablished without a recession.

Progress towards disinflation—which we expect to be visible in the June and July CPI and PCE price data—would also validate the Committee's plan of slowing the pace of monetary tightening and would further reduce the odds of back-to back hikes in July and September, in our view.

Spencer Hill

[8] To 4% or slightly below by year-end on a seasonally adjusted sequential basis.

Appendix

Exhibit 14: Core PCE Forecasts by Component

	Weight	May 2023 YoY	GS Bottom-up Core PCE Forecast: Dec. 2023 YoY	Dec. 2023 Contribution to Change	Dec. 2024 YoY	Dec. 2024 Contribution to Change
Core PCE	***100.0***	**4.6**	**3.5**	**-1.1**	**2.4**	**-2.2**
Core Goods	***26.6***	**2.6**	**0.5**	**-0.5**	**-0.7**	**-0.8**
New Vehicles	*2.4*	5.1	-1.5	**-0.1**	-0.4	**-0.1**
Used Vehicles	*1.7*	-2.6	-11.0	**-0.1**	-5.8	**0.0**
Household Appliances	*0.5*	-8.7	-7.1	**0.0**	-2.0	**0.0**
Video, Audio, Computers	*2.4*	-2.7	-3.3	**0.0**	-6.7	**-0.1**
Recreational Vehicles	*0.6*	0.6	1.0	**0.0**	1.1	**0.0**
Jewelry, Watches	*0.7*	7.9	3.9	**0.0**	1.2	**0.0**
Clothing & Footwear	*3.1*	2.9	2.8	**0.0**	-0.2	**-0.1**
Pharma & Medical	*4.2*	3.7	3.9	**0.0**	0.9	**-0.1**
Pets Products	*0.6*	10.6	5.7	**0.0**	2.0	**0.0**
Expenditures Abroad	*0.1*	9.6	10.8	**0.0**	0.6	**0.0**
Residual Core Goods	*10.5*	3.1	1.1	**-0.2**	-0.1	**-0.3**
Core Services	***73.4***	**5.4**	**4.6**	**-0.6**	**3.4**	**-1.5**
Housing	*17.1*	8.3	6.1	**-0.4**	4.2	**-0.7**
Ground Transportation	*0.4*	0.8	0.2	**0.0**	1.8	**0.0**
Air Transportation	*1.1*	2.6	3.4	**0.0**	3.3	**0.0**
Food Services & Accommodation	*8.4*	6.7	5.1	**-0.1**	3.5	**-0.2**
Financial Services & Insurance	*8.5*	3.1	4.3	**0.1**	2.8	**0.0**
Medical Services	*18.1*	2.7	3.4	**0.1**	2.7	**0.0**
Foreign Travel	*1.6*	5.2	2.9	**0.0**	3.1	**0.0**
Residual Core Services	*18.3*	6.3	4.7	**-0.3**	3.8	**-0.5**
Core services ex. housing	*56.3*	4.5	4.1	**-0.2**	3.2	**-0.8**

Source: Department of Commerce, Goldman Sachs Global Investment Research

The US Economic and Financial Outlook

THE US ECONOMIC AND FINANCIAL OUTLOOK

(% change on previous period, annualized, except where noted)

	2021	2022	2023 (f)	2024 (f)	2025 (f)	2026 (f)	2022 Q3	2022 Q4	2023 Q1	2023 Q2	2023 Q3	2023 Q4	2024 Q1	2024 Q2	2024 Q3	2024 Q4
OUTPUT AND SPENDING																
Real GDP	**5.9**	**2.1**	1.9	1.6	1.9	1.9	**3.2**	**2.6**	**2.0**	2.2	1.0	1.0	1.9	1.9	1.9	1.9
Real GDP (annual=Q4/Q4, quarterly=yoy)	**5.7**	**0.9**	1.5	1.9	1.9	1.9	**1.9**	**0.9**	**1.8**	2.5	1.9	1.5	1.5	1.4	1.7	1.9
Consumer Expenditures	**8.3**	**2.7**	2.1	1.7	1.9	1.9	**2.3**	**1.0**	**4.2**	1.3	1.4	1.6	1.9	1.9	1.9	1.9
Residential Fixed Investment	**10.7**	**-10.6**	-9.4	3.2	3.2	3.0	**-27.1**	**-25.1**	**-4.0**	10.7	0.0	2.0	3.5	3.5	3.5	3.5
Business Fixed Investment	**6.4**	**3.9**	2.5	2.7	3.6	3.6	**6.2**	**4.0**	**0.6**	4.0	0.5	0.9	3.6	3.6	3.6	3.6
Structures	**-6.4**	**-6.6**	5.7	1.3	3.0	3.0	**-3.6**	**15.7**	**15.8**	5.7	-3.0	-3.0	3.0	3.0	3.0	3.0
Equipment	**10.3**	**4.3**	-1.0	2.6	3.0	3.0	**10.6**	**-3.5**	**-8.9**	3.1	1.0	2.0	3.0	3.0	3.0	3.0
Intellectual Property Products	**9.7**	**8.8**	4.4	3.7	4.5	4.5	**6.8**	**6.2**	**3.1**	4.0	2.0	2.0	4.5	4.5	4.5	4.5
Federal Government	**2.3**	**-2.5**	3.5	0.3	0.0	0.0	**3.7**	**5.8**	**6.0**	3.0	1.0	0.0	0.0	0.0	0.0	0.0
State & Local Government	**-0.5**	**0.7**	2.7	0.5	0.9	1.0	**3.7**	**2.6**	**4.4**	3.3	0.8	0.0	0.0	0.1	0.9	0.9
Net Exports ($bn, '12)	**-1,233**	**-1,357**	-1,247	-1,311	-1,346	-1,366	**-1,269**	**-1,239**	**-1,208**	-1,246	-1,259	-1,273	-1,289	-1,303	-1,318	-1,334
Inventory Investment ($bn, '12)	**-19**	**125**	19	45	60	60	**39**	**137**	**4**	31	20	20	30	40	50	60
Industrial Production, Mfg.	**4.9**	**2.7**	-0.1	2.3	3.2	3.3	**0.0**	**-3.3**	**-0.4**	1.0	1.1	1.7	2.6	3.0	3.1	3.2
HOUSING MARKET																
Housing Starts (units, thous)	**1,606**	**1,551**	1,413	1,539	1,539	1,539	**1,446**	**1,405**	**1,385**	1,403	1,425	1,437	1,539	1,539	1,539	1,539
New Home Sales (units, thous)	**769**	**637**	657	708	716	716	**583**	**598**	**644**	652	660	671	691	710	714	716
Existing Home Sales (units, thous)	**6,128**	**5,081**	4,429	4,845	5,090	5,122	**4,777**	**4,197**	**4,327**	4,336	4,467	4,588	4,709	4,804	4,899	4,967
Case-Shiller Home Prices (%yoy)*	**19.0**	**7.4**	0.0	0.9	2.3	3.8	**13.1**	**7.4**	**2.2**	-2.1	-1.4	0.0	0.4	0.6	0.7	0.9
INFLATION (% ch, yr/yr)																
Consumer Price Index (CPI)**	**7.2**	**6.4**	3.3	2.9	2.5	2.4	**8.3**	**7.1**	**5.8**	4.0	3.1	3.0	2.9	2.9	3.1	2.9
Core CPI **	**5.5**	**5.7**	3.9	3.0	2.5	2.5	**6.3**	**6.0**	**5.6**	5.3	4.4	3.9	3.6	3.2	3.2	3.1
Core PCE** †	**5.0**	**4.6**	3.5	2.4	2.2	2.1	**4.9**	**4.8**	**4.7**	4.5	4.0	3.6	3.1	2.7	2.7	2.5
LABOR MARKET																
Unemployment Rate (%)^	**3.9**	**3.5**	3.6	3.6	3.6	3.6	**3.5**	**3.5**	**3.5**	3.6	3.6	3.6	3.6	3.6	3.6	3.6
U6 Underemployment Rate (%)^	**7.3**	**6.5**	6.7	6.7	6.7	6.6	**6.8**	**6.5**	**6.7**	6.6	6.6	6.7	6.7	6.7	6.7	6.7
Payrolls (thous, monthly rate)	**606**	**399**	210	100	80	78	**423**	**284**	**312**	261	150	117	100	100	100	100
Employment-Population Ratio (%)^	**59.5**	**60.1**	60.4	60.3	60.1	59.9	**60.1**	**60.1**	**60.4**	60.3	60.4	60.4	60.4	60.3	60.3	60.3
Labor Force Participation Rate (%)^	**62.0**	**62.3**	62.7	62.5	62.3	62.3	**62.3**	**62.3**	**62.6**	62.6	62.6	62.7	62.6	62.6	62.6	62.5
Average Hourly Earnings (%yoy)	**4.2**	**5.3**	4.2	3.9	3.6	3.6	**5.3**	**4.9**	**4.5**	4.3	4.1	4.0	4.0	3.9	3.8	3.7
GOVERNMENT FINANCE																
Federal Budget (FY, $bn)	**-2,775**	**-1,375**	-1,600	-1,650	-1,800	-1,800	--	--	--	--	--	--	--	--	--	--
FINANCIAL INDICATORS																
FF Target Range (Bottom-Top, %)^	**0-0.25**	**4.25-4.5**	5.25-5.5	4.5-4.75	3.5-3.75	3-3.25	**3-3.25**	**4.25-4.5**	**4.75-5**	**5-5.25**	5.25-5.5	5.25-5.5	5.25-5.5	5-5.25	4.75-5	4.5-4.75
10-Year Treasury Note^	**1.52**	**3.88**	3.90	3.75	3.75	3.75	**3.83**	**3.88**	**3.48**	**3.80**	3.90	3.90	3.80	3.75	3.75	3.75
Euro (€/$)^	**1.13**	**1.07**	1.10	1.15	1.15	1.15	**0.98**	**1.07**	**1.09**	**1.09**	1.07	1.10	1.11	1.12	1.13	1.15
Yen ($/¥)^	**115**	**132**	135	125	125	125	**145**	**132**	**133**	**145**	140	135	130	125	125	125

* 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, Joseph Briggs, Ronnie Walker, Tim Krupa and Manuel Abecasis, 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. **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 Type II Financial Instruments Firms Association, The Investment Trusts Association, Japan, and Japan Investment Advisers 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

Goldman Sachs Global Investment Research 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.

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 and the Republic of Ireland; GSI - Succursale de Paris (Paris branch) which is 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 Global Investment Research. 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 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.