Goldman Sachs | Economics Research

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US Economics Analyst

# Rate Cuts (Mericle)

- Our baseline forecast calls for the FOMC to start cutting the funds rate in 2024Q2. At that point, we expect core PCE inflation to have fallen below 3% year-on-year and below 2.5% on a monthly annualized basis. The motivation for cutting outside of a recession would be to normalize the funds rate from a restrictive level back toward neutral once inflation is closer to the target.
- Normalization is not a particularly urgent motivation for cutting, and for that reason we also see a significant risk that the FOMC will instead hold steady. The FOMC might not cut because inflation might not fall enough or, even if it does, because solid growth, a tight labor market, and a further easing of financial conditions might make cutting seem like an unnecessary risk.
- Some Fed officials and investors argue that the FOMC must cut as inflation falls to prevent real interest rates from rising and hurting the economy. We disagree with this logic. Real interest rates should be calculated by subtracting off forward-looking inflation expectations, not realized inflation, and inflation expectations have already fallen to or nearly to target-consistent levels. Moreover, adjusting our broader financial conditions index (FCI) for inflation rather than the funds rate has very little impact on the implied impulse to GDP growth, which is now modest.
- We are penciling in 25bp of cuts per quarter but are uncertain about the pace. The FOMC might move slowly if its desire to normalize is only lukewarm and it fears further boosting asset prices and strengthening an economy with an already-tight labor market, or it could cut more quickly from a high starting point if it is more confident that the inflation problem is unlikely to return.
- We expect the funds rate to eventually stabilize at 3-3.25%, above the FOMC's 2.5% median longer run dot. We have long been skeptical that neutral was as low as widely thought last cycle, and larger fiscal deficits have arguably pushed it higher since. Fed officials could raise their longer run dots if the economy remains resilient with the funds rate at a much higher level or they could conclude—as a recent New York Fed blog post did—that the short-run neutral rate is elevated.
- Our views have been more hawkish than market pricing this year because we have seen both a lower probability of recession than consensus and a relatively high threshold for rate cuts. This remains true, though the gap has narrowed as

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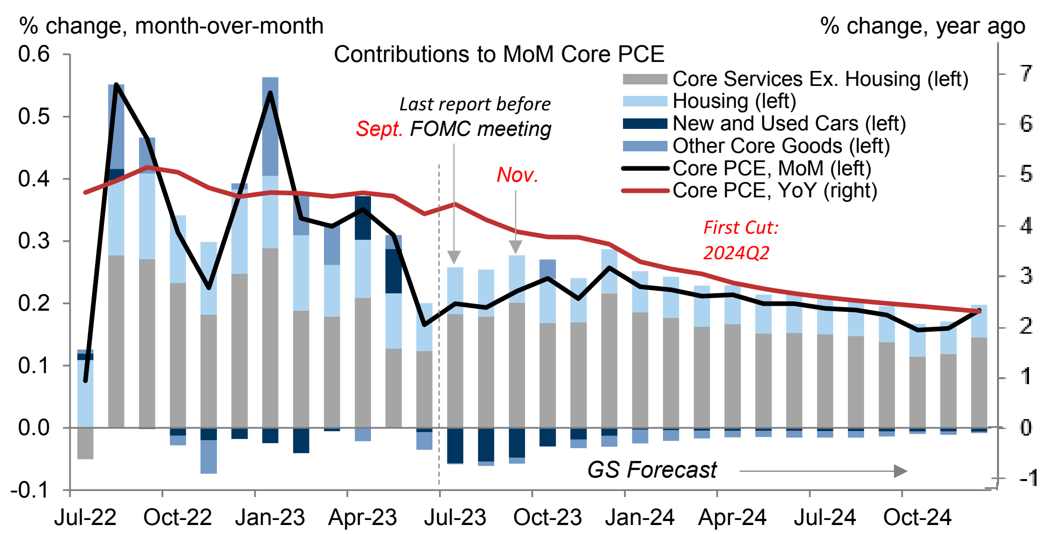
recessions fears have faded.  We think it is appropriate for the yield curve to be inverted, but not quite as much as it is.

# Rate Cuts

The soft July CPI report and dovish comments from New York Fed President John Williams this week supported our view that the FOMC is likely to skip a rate hike at the September meeting and ultimately decide in November that the core inflation trend has slowed enough to make a final hike unnecessary.

In this week's *Analyst*, we discuss our views on possible rate cuts next year. Our baseline forecast calls for cuts to start in 2024Q2, proceed at 25bp per quarter, and end at 3-3.25%. But we do not see a strong need to cut and consequently we think there is a significant risk that the FOMC will instead hold steady.

**Exhibit 1: The Latest Inflation Data Support Our Expectation That the Core Trend Will Have Slowed Enough by November for the FOMC to Conclude That a Final Hike Is Unnecessary**

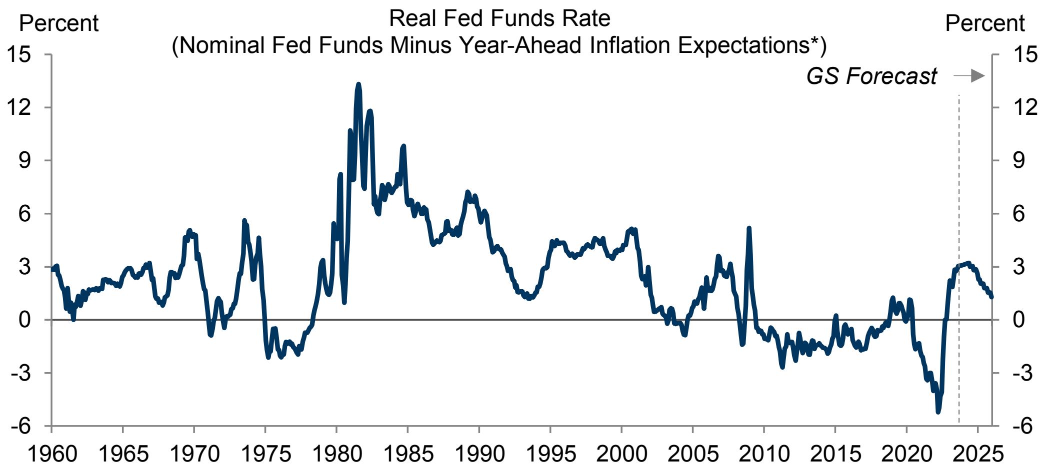



Source: Department of Commerce, Goldman Sachs Global Investment Research

### Question 1: What would cause the FOMC to cut?

The FOMC could cut for any of three reasons: a recession, a moderate growth scare, or a convincing decline in inflation. We have long seen a high threshold for cutting because Fed officials will want to minimize the risk that they could regret cutting if inflation stays too high. Last year we initially took the view that the FOMC was unlikely to cut until a growth scare emerged, but we softened our stance earlier this year and have since assumed that a convincing decline in inflation would probably be enough to prompt cuts. We made this change in part because Fed officials increasingly emphasized that once inflation came down, it would no longer be necessary or appropriate to keep the funds rate so high relative to estimates of the neutral rate. The cuts in our forecast are driven by this desire to normalize the funds rate from a restrictive level once inflation is closer to target, not by a recession.

**Exhibit 2: Our Baseline Forecast Calls for Rate Cuts Without a Recession Because Once Inflation Comes Down, the Funds Rate Will Not Need to Remain High Relative to Recent History and Estimates of Neutral**




* For year-ahead inflation expectations, we use one-year inflation swaps since 2006, Michigan inflation expectations rescaled to the level and standard deviation of breakevens between 1978 and 2005, and one-year inflation expectations from the Livingston survey before 1978.

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

### Question 2: When will the FOMC deliver the first rate cut?

We expect the first rate cut in 2024Q2. By that point, we expect core PCE inflation to have fallen below 3% on a year-on-year basis and below 2.5% on a monthly annualized basis, and wage growth to have fallen below 4% year-on-year. Those thresholds for cutting align roughly with the annual forecasts in the FOMC's Summary of Economic Projections and the conditions at the outset of the last cutting cycle motivated by an intent to normalize from a restrictive policy stance as inflation came down in 1995.

**Exhibit 3: We Expect the First Cut in 2024Q2 with Core PCE Inflation Below 3% YoY and 2.5% MoM Annualized, Similar to the Starting Conditions of the Last Cycle of Normalization Cuts**

| Initial Conditions During Cutting Cycles Driven Largely by Normalization from a Restrictive Monetary Policy Stance | Jul-95 | 2024Q2 (GS Forecast) |
|---|---|---|
| Initial Fed funds rate | 6.0 | 5.375 |
| Rate cut | -0.25 | -0.25 |
| | | |
| Unemployment rate | 5.7 | 3.5 |
| Unemployment rate 1-year ahead forecast | 6.1 | 3.5 |
| FOMC sustainable unemployment rate estimate | 5.9 | 4.0 |
| Implied unemployment gap | -0.2 | -0.5 |
| | | |
| CPI headline (yoy) | 3.2 | 2.9 |
| CPI core (yoy) | 3.0 | 3.0 |
| PCE headline (yoy) | 2.4 | 2.5 |
| PCE core (yoy) | 2.6 | 2.7 |
| | | |
| ECI (yoy) | 2.9 | 3.9 |

Note: We use real-time data where available, but use the first historical vintage available after the meeting for the sustainable unemployment rate, core CPI, core PCE, and ECI.

Source: ALFRED, Department of Commerce, Department of Labor, Goldman Sachs Global Investment Research

**Question 3: How confident are you that the FOMC will cut next year?**

We are far from certain and have long put substantial probability weight on an outcome where the FOMC does not cut in our fed funds rate scenario analysis, shown below as the red line in Exhibit 9.

While we think the right baseline forecast is that the FOMC will cut as inflation comes down because a 5.25-5.5% funds rate will no longer appear necessary, normalization for normalization's sake is not a particularly urgent motivation for cutting and it could be overridden by other concerns. While there is no perfect historical analogy for a potential cutting cycle starting next year, this desire to normalize a policy stance that has become inappropriate rather than to solve an immediate problem is somewhat similar to the motivation for hiking last cycle. One lesson from that episode is that because the purpose was not urgent, when a risk emerged after the very first hike in the form of a manufacturing slowdown, the FOMC decided to stop for a while.

Why might the FOMC not cut? The simplest reason is that inflation might not come down quite enough. Another possible reason is that even if it does, if GDP growth is above potential, the unemployment rate is pushing below its 50-year low, and financial conditions have eased further on enthusiasm about a soft landing, then stimulating an already-strong economy by cutting might seem like an unnecessary risk, especially with the memory of the recent inflation surge still fresh.

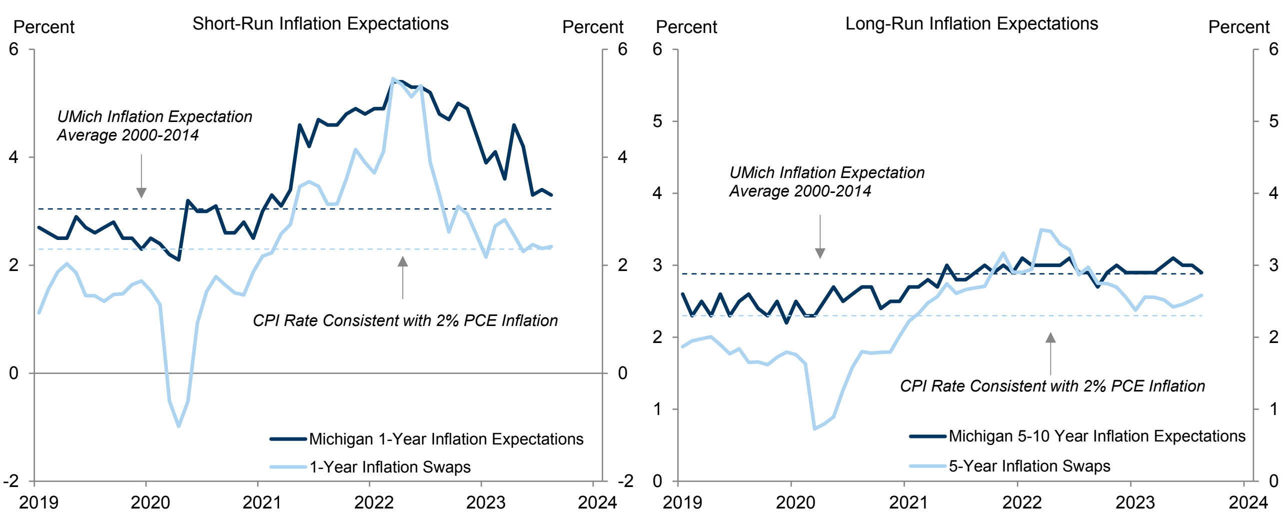
In that scenario, the FOMC could say—as a New York Fed blog post concluded earlier this week—that the short-run neutral rate is higher than common estimates of the medium-run neutral rate, and as a result the monetary policy stance is actually not so restrictive and the need to cut is not so immediate. The Fed researchers noted that their estimate of the short-run neutral rate was elevated because financial conditions are not that tight. This is similar to saying that while 5.5% is a high level for the funds rate relative to recent history, the level of our financial conditions index (FCI) is not particularly high, or—as we prefer to put it—that the drag on GDP growth from rate hikes implied by our FCI growth impulse is now largely behind us and the economy is still operating at full employment and a high level of resource utilization. Either way, the implication is that there is not a problem that needs to be fixed.

**Question 4: But doesn't the FOMC have to cut the funds rate as inflation falls to prevent the real funds rate from rising and weakening the economy?**

In an interview earlier this week, President Williams made an argument often heard in markets, that as inflation comes down, "if we don't cut interest rates at some point next year then real interest rates will go up, and up, and up. And that won't be consistent with our goals." We have repeatedly expressed skepticism of this argument since early last year, for two reasons.

First, real interest rates should be calculated by subtracting off forward-looking inflation expectations rather than backward-looking realized inflation. This is important because while year-on-year core inflation still has about two percentage points to fall, inflation expectations—even year-ahead expectations—have already normalized to within at most a few tenths of target-consistent levels. This means that nearly all of the decline in inflation expectations that would raise real interest rates for a given nominal rate is behind us.

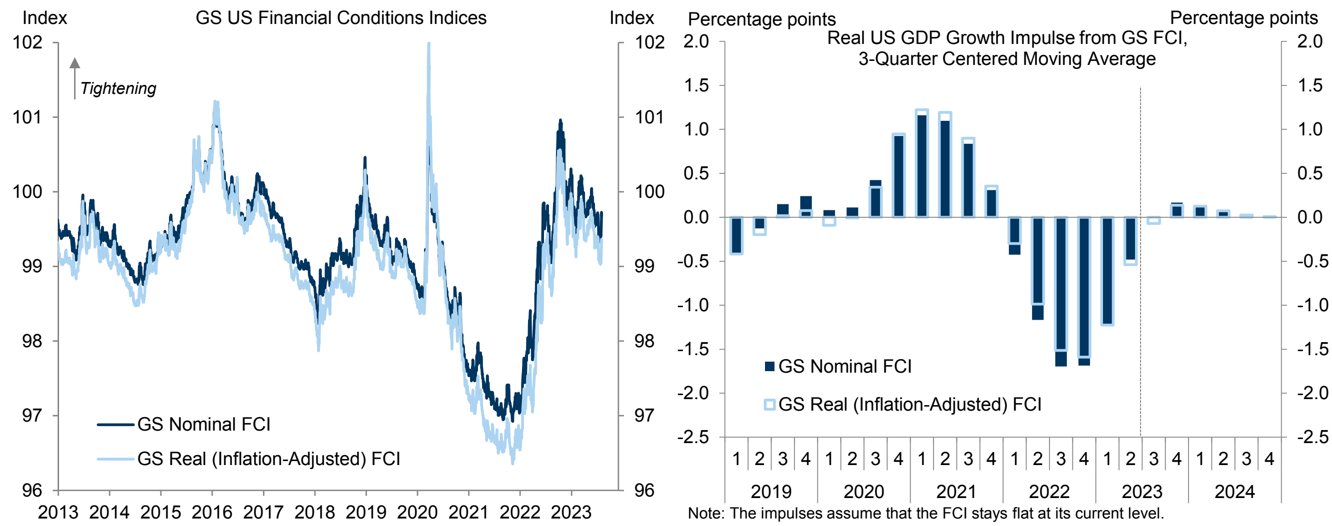
**Exhibit 4: Inflation Expectations Have Already Normalized Most of the Way to Target-Consistent Levels, Meaning That There Is Little Room for a Further Decline to Boost Real Rates**




Source: University of Michigan, Goldman Sachs Global Investment Research

Second, the funds rate itself is not that important for economy activity, which is why we focus instead on broad financial conditions. As a result, rather than focusing on the real fed funds rate, we think it is more useful to adjust our nominal FCI for inflation and use the resulting real FCI to recalculate the impulse to GDP growth. But the takeaway from that exercise is that the nominal and real FCIs imply very similar growth impulses. The reason that adjusting broad financial conditions for inflation does not matter very much now and mattered only a little last year is that our FCI framework finds that long-term interest rates matter much more for economic activity than short-term rates, and long-term inflation expectations never rose or fell nearly as much as short-term expectations, let alone realized inflation. Put simply, no one took out a mortgage last year expecting inflation to remain at 9% for 30 years.

**Exhibit 5: Adjusting Our Financial Conditions Index for Inflation Does Not Change the Implied Impulse to GDP Growth by Much**




Source: Goldman Sachs Global Investment Research

Of course, it is the perspective of the policymakers that matters for policy decisions. But Exhibit 6 shows that Fed officials have taken different views on this issue over time and had an interpretation closer to ours last year, so it is possible that they could change their minds.

**Exhibit 6: Fed Officials Have Put Different Degrees of Emphasis on the Real Fed Funds Rate Over Time**

| Fed Official | Date | Comment |
|---|---|---|
| Williams | 8/7/2023 | "Assuming inflation continues to come down, ... if we don't cut interest rates at some point next year then real interest rates will go up, and up, and up. And that won't be consistent with our goals. So I do think that from my perspective, to keep maintaining a restrictive stance may very well involve cutting the federal funds rate next year, or year after, but really it's about how are we affecting real interest rates — not nominal rates." |
| Powell | 7/26/2023 | "I think you take everything into account when you start cutting rates. ... And when people write down rate cuts next year, you know, it just is a sense that inflation is coming down and we're comfortable that it's coming down and it's time to start cutting rates." |
| Powell | 6/14/2023 | "as inflation comes down in the forecast, if you don't lower interest rates, then real rates are actually going up, right? So just to maintain a real rate, the nominal rate at that point—two years out, let's say—should come down just to maintain real rates." |
| Powell | 12/14/2022 | "I wouldn't see the Committee cutting rates until we're confident that inflation is moving down in a sustained way. That would be my test. I don't see us as having a really clear and precise understanding of what the neutral rate is and what real rates are so that it would mechanically happen like that ... it'll be a question of, do we actually feel confident that inflation is coming down in a sustained way?" |
| Powell | 9/21/2022 | You want to be at a place where real rates are positive across the entire yield curve. And I think that would be the case if you look at the numbers that we're writing down and think about—you measure those against some sort of forward-looking assessment of inflation, inflation expectations. |
| Powell | 6/15/2022 | "So the question really is, how high does the rate really need to go? ... And how do you think about that? Well, you can think about the longer-run neutral rate, you can compare it to that, and we think that's in the mid-2s. You can look, frankly, at broader financial conditions. You can look at asset prices, you can look at the effect they're having on the economy, rates, asset prices, credit spreads—all of those things go into that. You can also look at the yield curve and ask, all along the yield curve, where is the policy rate? So for much of the yield curve now, real rates are positive. That's not true at the short end. At the short end of the yield curve in the early years, you don't have real—you have negative rates still. So that really is one data point—it's one part of financial conditions. So I think—I have to look at it this way: We move the policy rate. That affects financial conditions. And that affects the economy ... ultimately, it comes down to, do we think financial conditions are in a place where they're having the desired effect on the economy?" |

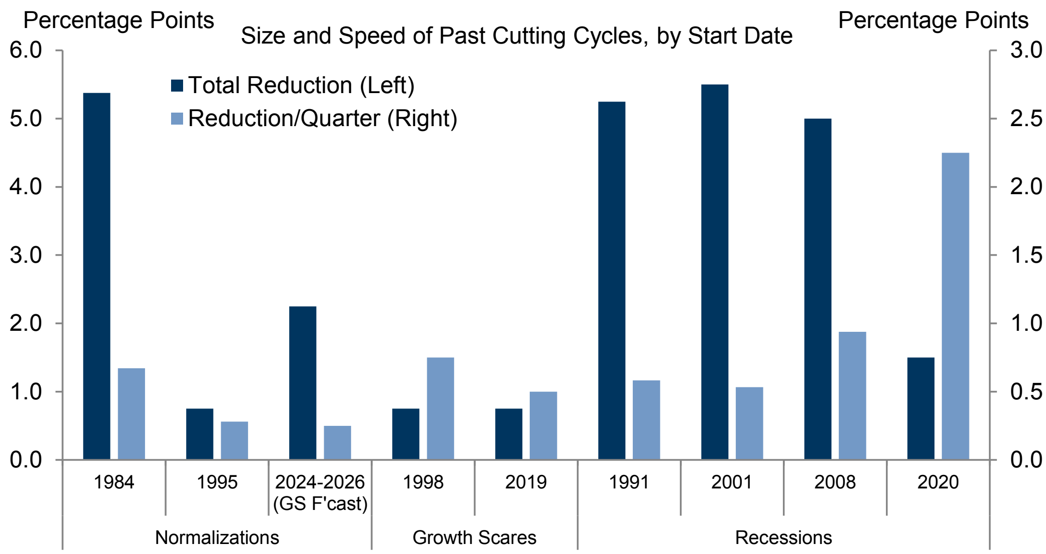
Source: Federal Reserve Board, New York Times, Goldman Sachs Global Investment Research

### Question 5: How quickly will the FOMC cut interest rates?

How quickly the FOMC will cut interest rates depends on why it is cutting and where inflation stands when cuts begin. In a full recession, which we do not expect, the FOMC would likely cut aggressively. In a moderate growth scare similar to the 2019 trade war that prompted a round of "insurance cuts," the historical precedent of three consecutive 25bp rate cuts is a good guess of the initial response.

But in our forecast, the cuts are instead motivated by a desire to gravitate back toward neutral as inflation comes down, not to stimulate the economy in response to a negative shock. We have penciled in 25bp of cuts per quarter in that scenario but are uncertain about the pace. The FOMC might aim to cut slowly if its desire to normalize is only lukewarm and it fears further boosting asset prices and strengthening an economy with an already-tight labor market, or it could end up cutting slowly without intending to if cuts are disrupted by, for example, upside surprises on inflation. Alternatively, the high starting point of the funds rate might instead lead the FOMC to cut more quickly, perhaps at consecutive meetings, especially if it is more confident that the inflation problem is unlikely to return.

**Exhibit 7: We Have Penciled in 25bp of Cuts Per Quarter but Are Uncertain About the Pace and Would Expect It to Be Faster If a Growth Scare or a Recession Arises**

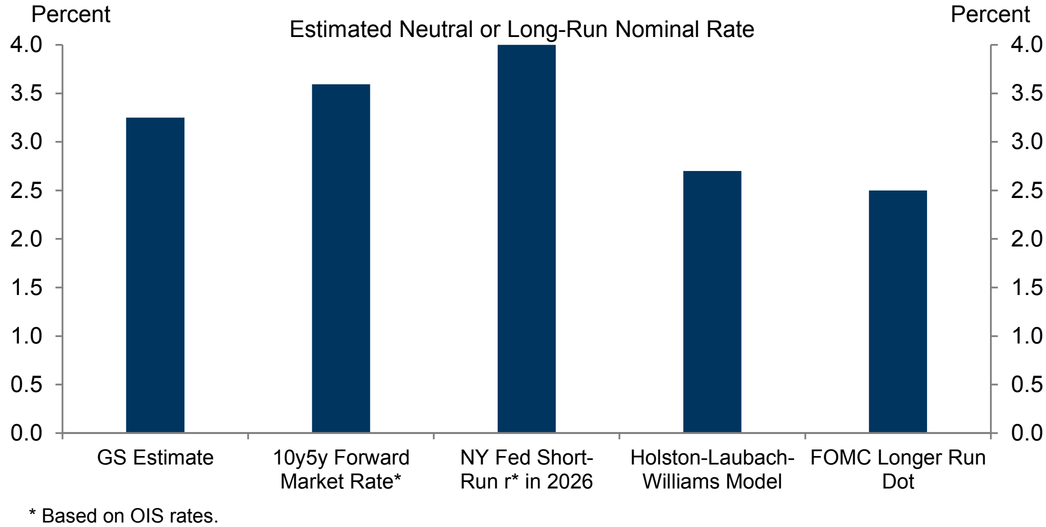



Source: Federal Reserve Board, Haver Analytics, Goldman Sachs Global Investment Research

### Question 6: At what terminal rate will the cutting cycle end?

We expect the funds rate to stabilize at 3-3.25%, above the FOMC's 2.5% median longer run dot. We have long been skeptical that neutral was as low as widely thought last cycle, and larger fiscal deficits have arguably pushed it higher since. Investors increasingly appear to take this view as well—market-based proxies for the neutral rate have risen meaningfully since last cycle. While the FOMC's longer run dot has remained stable, there is plenty of time for the FOMC to revise its estimate if the economy remains resilient with the funds rate at a much higher level. Alternatively, the FOMC could adopt the view discussed above from a recent New York Fed blog post that short-run neutral is higher than the longer run neutral rate shown in the dot plot. The latest update of the New York Fed's DSGE model estimates that the short-run nominal neutral rate will be 4% in 2026, when cuts end in our forecast.

**Exhibit 8: We Expect the Funds Rate to Stabilize at 3-3.25%, Not the FOMC's 2.5% Longer Run Estimate, in Part Because We Think Neutral Is Higher Than Was Widely Thought Last Cycle**




Source: Haver Analytics, Federal Reserve Bank of NY, Federal Reserve Board, Goldman Sachs Global Investment Research

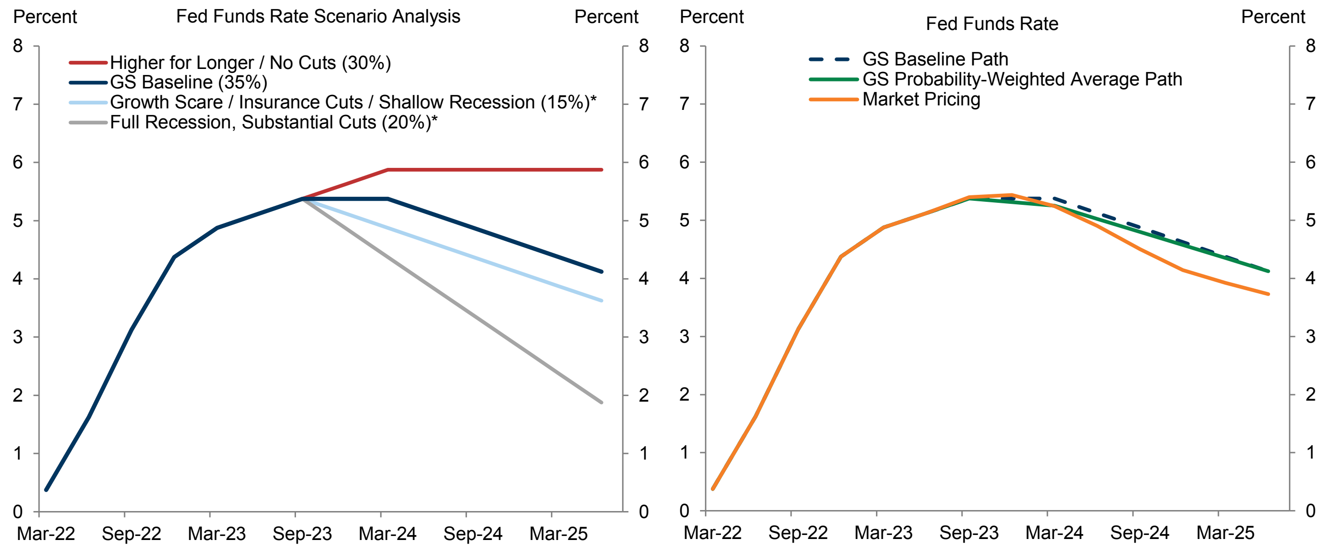
### Question 7: What do your views imply about the front end of the yield curve?

We compare our views to market pricing using our fed funds rate scenario analysis. We assign subjective probabilities to several possible paths for the funds rate over the next two years and then compare the resulting probability-weighted average path to the front end of the yield curve.

At the moment, our probability-weighted forecast is nearly identical to our baseline forecast. Our probability-weighted view has been more hawkish than market pricing since the start of the year because we have seen both a lower probability of recession than consensus and a relatively high threshold for rate cuts. This remains true, though the gap has narrowed as recessions fears have faded.

While many investors are accustomed to thinking of an inverted yield curve as an indication of elevated recession risk, our scenario analysis implies that one can see a soft landing as the most likely outcome and still think that the curve should be inverted. The net cuts currently priced into the curve reflect both some probability that investors attach to recession and some probability of cuts in a soft landing, and the ratio has surely tilted away from the former and toward the latter over the course of this year.

**Exhibit 9: Our Views Remain a Bit More Hawkish Than Market Pricing on a Like-to-Like Probability-Weighted Basis, Though the Gap Has Narrowed as Recession Fears Have Diminished**




* The recession scenarios show unrealistically slow cuts to capture many sub-scenarios of recessions starting at various points in time. The recession scenarios reflect our subjective recession probability of 20% over the next 12 months and modestly elevated risk in the following year.

Source: Goldman Sachs Global Investment Research

**David Mericle**

*We thank Elsie Peng for help with this report.*

# 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 | 2.1 | 1.7 | 1.9 | 1.9 | 3.2 | 2.6 | 2.0 | 2.4 | 1.5 | 1.1 | 1.7 | 1.9 | 1.9 | 1.9 |
| *Real GDP (annual=Q4/Q4, quarterly=yoy)* | 5.7 | 0.9 | 1.7 | 1.8 | 1.9 | 1.9 | 1.9 | 0.9 | 1.8 | 2.6 | 2.1 | 1.7 | 1.7 | 1.5 | 1.6 | 1.8 |
| Consumer Expenditures | 8.3 | 2.7 | 2.2 | 1.8 | 1.9 | 1.9 | 2.3 | 1.0 | 4.2 | 1.6 | 1.6 | 1.4 | 1.9 | 1.9 | 1.9 | 1.9 |
| Residential Fixed Investment | 10.7 | -10.6 | -11.3 | 2.9 | 3.2 | 3.0 | -27.1 | -25.1 | -4.0 | -4.1 | 4.5 | 2.5 | 3.5 | 3.5 | 3.5 | 3.5 |
| Business Fixed Investment | 6.4 | 3.9 | 3.1 | 2.4 | 3.6 | 3.6 | 6.2 | 4.0 | 0.6 | 7.7 | -0.7 | 1.3 | 2.2 | 3.1 | 3.7 | 3.9 |
| Structures | -6.4 | -6.6 | 6.4 | 0.8 | 2.8 | 3.0 | -3.6 | 15.7 | 15.8 | 9.7 | -3.9 | -1.5 | 1.0 | 1.5 | 2.5 | 2.5 |
| Equipment | 10.3 | 4.3 | -0.1 | 2.4 | 3.2 | 3.0 | 10.6 | -3.5 | -8.9 | 10.8 | -1.8 | 2.0 | 2.0 | 2.5 | 3.5 | 4.0 |
| Intellectual Property Products | 9.7 | 8.8 | 4.4 | 3.3 | 4.5 | 4.5 | 6.8 | 6.2 | 3.1 | 3.9 | 2.0 | 2.0 | 3.0 | 4.5 | 4.5 | 4.5 |
| Federal Government | 2.3 | -2.5 | 3.1 | 0.2 | 0.0 | 0.0 | 3.7 | 5.8 | 6.0 | 0.9 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| State & Local Government | -0.5 | 0.7 | 2.8 | 0.5 | 0.9 | 1.0 | 3.7 | 2.6 | 4.4 | 3.6 | 0.8 | 0.0 | 0.0 | 0.1 | 0.9 | 0.9 |
| Net Exports ($bn, '12) | -1,233 | -1,357 | -1,206 | -1,249 | -1,282 | -1,300 | -1,269 | -1,239 | -1,208 | -1,206 | -1,199 | -1,212 | -1,228 | -1,241 | -1,255 | -1,271 |
| Inventory Investment ($bn, '12) | -19 | 125 | 10 | 45 | 60 | 60 | 39 | 137 | 4 | 9 | 11 | 15 | 30 | 40 | 50 | 60 |
| Industrial Production, Mfg. | 4.9 | 2.7 | 0.1 | 2.4 | 3.3 | 3.3 | 0.0 | -3.3 | -0.3 | 1.5 | 1.5 | 1.8 | 2.5 | 2.9 | 3.2 | 3.4 |
| **HOUSING MARKET** | | | | | | | | | | | | | | | | |
| Housing Starts (units, thous) | 1,606 | 1,551 | 1,424 | 1,539 | 1,539 | 1,539 | 1,446 | 1,405 | 1,385 | 1,447 | 1,425 | 1,437 | 1,539 | 1,539 | 1,539 | 1,539 |
| New Home Sales (units, thous) | 769 | 637 | 695 | 713 | 716 | 716 | 583 | 598 | 638 | 694 | 726 | 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 | 3.1 | 3.0 | 2.4 | 2.4 | 8.3 | 7.1 | 5.8 | 4.1 | 3.3 | 3.0 | 2.9 | 2.9 | 2.9 | 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 | 3.5 | 3.1 | 3.2 | 3.1 |
| 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 | 3.0 | 2.6 | 2.6 | 2.4 |
| **LABOR MARKET** | | | | | | | | | | | | | | | | |
| Unemployment Rate (%)^ | 3.9 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.6 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 |
| U6 Underemployment Rate (%)^ | 7.3 | 6.5 | 6.7 | 6.7 | 6.7 | 6.7 | 6.8 | 6.5 | 6.7 | 6.9 | 6.7 | 6.7 | 6.7 | 6.7 | 6.7 | 6.7 |
| Payrolls (thous, monthly rate) | 606 | 399 | 211 | 103 | 80 | 78 | 423 | 284 | 312 | 228 | 162 | 142 | 112 | 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 | 60.4 | 60.3 | 60.3 |
| Labor Force Participation Rate (%)^ | 62.0 | 62.3 | 62.6 | 62.5 | 62.3 | 62.3 | 62.3 | 62.3 | 62.6 | 62.6 | 62.6 | 62.6 | 62.6 | 62.6 | 62.5 | 62.5 |
| 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 | 1.08 | 1.15 | 1.15 | 1.15 | 0.98 | 1.07 | 1.09 | 1.09 | 1.09 | 1.08 | 1.10 | 1.11 | 1.12 | 1.15 |
| Yen ($/¥)^ | 115 | 132 | 138 | 125 | 125 | 125 | 145 | 132 | 133 | 144 | 143 | 138 | 133 | 128 | 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

# Disclosure Appendix

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