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Economics Weekly
The Fed Is Starting to Think About Ending QT

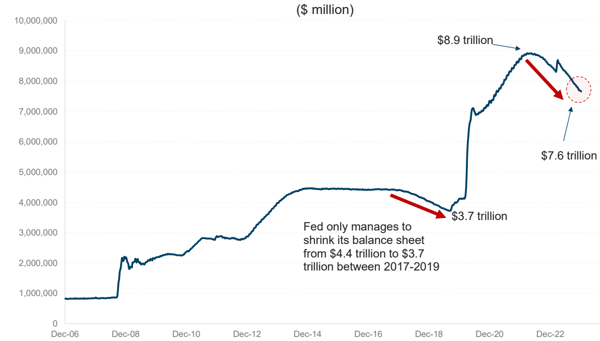
Please refer to important disclosures on pages 15 and 16. Analyst certification is on page 15.

> *Several participants remarked that the Committee's balance sheet plans indicated that it would slow and then stop the decline in the size of the balance sheet when reserve balances are somewhat above the level judged consistent with ample reserves. These participants suggested* ***that it would be appropriate for the Committee to begin to discuss the technical factors that would guide a decision to slow the pace of runoff well before such a decision was reached in order to provide appropriate advance notice to the public*** [emphasis added].
>
> – Minutes to the December FOMC Meeting

> *So, given the rapid decline of the ON RRP, I think it's appropriate to consider the parameters that will guide a decision to slow the runoff of our assets. In my view, we should slow the pace of runoff as ON RRP balances approach a low level. Normalizing the balance sheet more slowly can actually help get to a more efficient balance sheet in the long run by smoothing redistribution and reducing the likelihood that we'd have to stop prematurely.*
>
> – Dallas Fed President Lorie Logan

The minutes to the December FOMC meeting revealed some discussion around when to end quantitative tightening (QT) (referenced in the first quote above). Subsequent to that, Dallas Fed President Lorie Logan (the likely instigator of the discussion at the FOMC meeting) broached this topic in her speech over the weekend to the AEA (the second quote referenced above). That the Fed is already talking about ending QT when its balance sheet has only shrunk by $1.2 trillion (from $8.9 trillion to $7.6 trillion, exhibit 1), after having increased by close to $5 trillion since the start of the pandemic, may seem quite strange. **In this *Economics Weekly* we delve into what has motivated this discussion on ending QT so soon and what gauges the Fed is using to decide how large its balance sheet ought to be.**

Exhibit 1
Size of the Fed's Balance Sheet
($ million)



Sources: Federal Reserve, William Blair Equity Research

Moving From Corridors to Floors

Everything changed for the Fed in 2008, when Chairman Bernanke successfully lobbied Congress to allow the Fed to pay interest on bank reserves and excess reserves. This is why the Fed's balance sheet is unlikely to ever shrink back to its level pre-2008 (i.e., $800 billion) and why it now needs to have a large balance sheet.

Prior to 2008 the Fed was operating what was called a corridor system to achieve/manage its fed funds target rate. This corridor ceiling was made up of the discount rate (banks could borrow funds from the Fed's slightly more expensive discount window if they needed them), and the floor was the effective fed funds rate (which was the interbank rate where banks could borrow funds from one another). The Fed would also conduct open market operations to maintain this target rate.

For the Fed to undertake QE—a process that floods the system with bank reserves when purchasing financial assets—it needed to ensure that it would still be able to control monetary policy and the policy rate in a world where banks were stuffed to the gills with excess reserves. After all, if banks have more reserves than they know what to do with, there's no need to borrow or lend those reserves in the interbank market. The fed funds rate would then plunge to zero, and the market would disappear. This is effectively what has happened with the fed funds market today, where trading volumes have collapsed.

Without the power to control the flow of those reserves, the Fed would have no control over the main policy rate if/when it decided to raise rates to slow growth and inflation. Paying an interest rate on reserves held at the Fed allowed the Fed to limit the flow being borrowed/lent; after all, who would risk lending to another bank for a rate less than what the Fed was willing to pay it to sit on those reserves risk-free.

Crucially, paying interest on reserves and excess reserves effectively divorced the size of the Fed's balance sheet from its monetary policy stance. This has meant that the interest rate on those reserve balances (IORB) and excess reserves (IOER) and the secured overnight financing rate (SOFR) have become the actual policy rates—even though the Fed still targets the fed funds rate as the main policy rate. This has made the interest rate on reserve balances the new floor interest rate.

One snag to this was growth in the shadow banking system (or non-bank financial institutions), which included the GSEs. The Fed needed to control this market as well, but many of these entities are not permitted to either hold reserve or earn interest on reserve balances. As a result, the Fed had to also introduce the repo and reverse repo market, whereby (in the overnight reverse repo program, ON RRP) it swaps Treasury securities for cash from the shadow banks, allowing the Fed to mop up excess cash in the system. This has meant that the ON RRP has become a new subfloor rate, given that its rate is typically just below what the Fed is willing to pay eligible banks on their reserves.

Lastly, due to recent volatility in the rates market over the last few years (remember the repo madness episode of 2019?), in July 2021, the Fed established a standing repo facility (SRF). The SRF's goal is "*to serve as a backstop in money markets to support the effective implementation and transmission of monetary policy and smooth market functioning. The SRF is designed to dampen upward pressures in repo markets that may spillover to the fed funds market.*" Effectively, the facility acts as a kind of discount window for those select banks and shadow banks, who again are ineligible to visit the discount window, to engage in repo transactions with the Fed.

The upshot of all this is that to manage monetary policy today, the Fed needs enough reserves in the system to make sure the interest rate on reserve balances (and excess reserves) and the ON RRP all run smoothly. This means there needs to be "ample" reserves in the system.

While the Fed could return to a corridor system—which some market participants argue would be preferable—the Fed believes that the floor system offers better control over the policy rate. The corridor system ended up being more operationally complex and was not quite as adept in responding to temporary surges in demand for highly liquid risk-free assets. Hence, we seem stuck with a floor system, with little chance of going back.

What Does Ample Mean?

In discussing QT the Fed tells us:

> *Over time, the Committee intends to maintain securities holdings in amounts needed to implement monetary policy efficiently and effectively in its ample reserves regime.*
>
> - *To ensure a smooth transition,* ***the Committee intends to slow and then stop the decline in the size of the balance sheet when reserve balances are somewhat above the level it judges to be consistent with ample reserves.*** [emphasis added]
>
> - *Once balance sheet runoff has ceased, reserve balances will likely continue to decline for a time, reflecting growth in other Federal Reserve liabilities, until the Committee judges that reserve balances are at an ample level.*
>
> - *Thereafter, the Committee will manage securities holdings as needed to maintain ample reserves over time.*

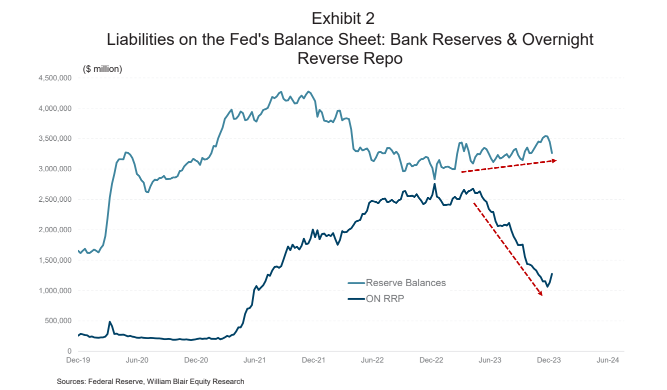
The questions for the Fed and the market are: What does ample actually mean? and How ample is ample enough?

The reality is that we don't really know. The closest the Fed has come to defining it was a 2021 report that cited the "Lowest Comfortable Level of Reserves" (LCLoR) of 8% of GDP.

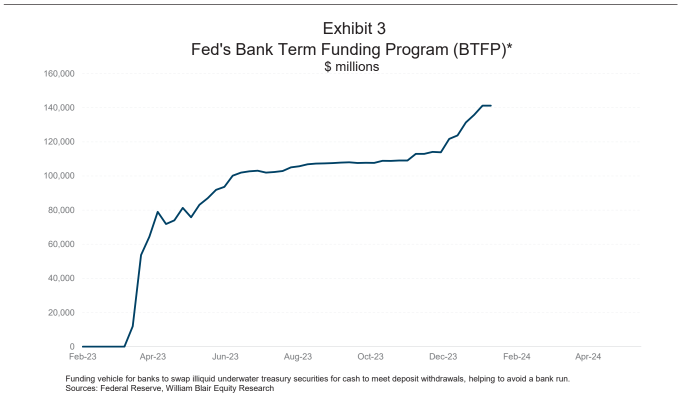
More recently, "the Waller rule" has emerged citing an appropriate level of around 10%-11%. Fed Governor Patrick Waller remarked: "*We'll start slowing as we approach maybe reserves being 10% to 11% of GDP, and then we'll kind of feel our way around to see where we should stop.*"

When the Fed allows maturing Treasury and MBS securities to roll off without reinvesting the assets, it shrinks the asset side of its balance sheet. On the liability side, this will typically be matched by bank reserves disappearing and/or a decline in the ON RRP accounts.

The level of bank reserve balances today has actually been steadily *increasing,* due to the greater demand for a reduction in the use of the reverse repo market, as money from these accounts has been flowing off the Fed's balance sheet and back into money market funds (exhibit 2).



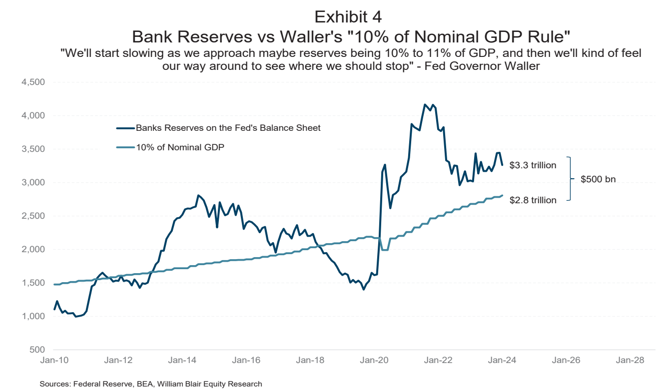
The size of the balance sheet has also been boosted by the use of the Fed's Bank Term Funding Program, which was set up during the peak of regional banking crisis and somewhat concerningly is still seeing significant inflows (exhibit 3). This facility allows banks to swap underwater Treasury securities (at par!) for cash from the Fed at a rate that is lower than the discount rate. This has enabled them to earn a spread by borrowing funds cheaply (4.89%) and then reinvesting them right back at the Fed to earn the IORB (5.4%). An open question is what happens when this facility is due to expire on March 11.



Bank reserves today sit at $3,262 billion, compared with 10%-11% of nominal GDP that would be between $2,784 billion and $3,063 billion (exhibit 4).

As a percentage of GDP, the Fed's bank reserves are currently at 12.4%.

By this measure, a further reduction in reserves of about $500 billion is deemed necessary to reach that target. In 2022, the Fed reduced the amount of bank reserves by an average of $91.5 billion per month; in 2023 it added to reserves by an average of $35 billion per month. Very roughly, when the ON RRP drawdown ends and reserves need to start falling again, it would suggest that the new level of ample reserves is likely to be reached later this year.



Another less optimal strategy to determine the appropriate level of reserves would be letting the market tell us. However, this would unfortunately entail "something breaking," as happened in 2019, and clearly the hope is to avoid this from happening again.

The addition of the SRF since then was intended to help ensure that this risk is much lower and that further reductions can be achieved without a major blowup.

Where Else Can We Look for Signs of Pressure?

In her speech, Dallas Fed President Lorie Logan noted that the recent volatility in the SOFR rate is a sign that liquidity might be starting to tighten:

> *As we did in 2018 and early 2019, we are likely to see modest, temporary rate pressures as our balance sheet shrinks and our liabilities redistribute. These rate pressures can be a price signal that helps market participants redistribute liquidity to the places where it's needed. Experience shows that these pressures tend to emerge first on dates when liquidity is unusually encumbered or is draining out of the system especially rapidly, like tax-payment dates, Treasury settlements and month-ends.*
> *And indeed, we saw small, temporary rises in the Secured Overnight Financing Rate (SOFR) over the November–December and year-end turns. But on*

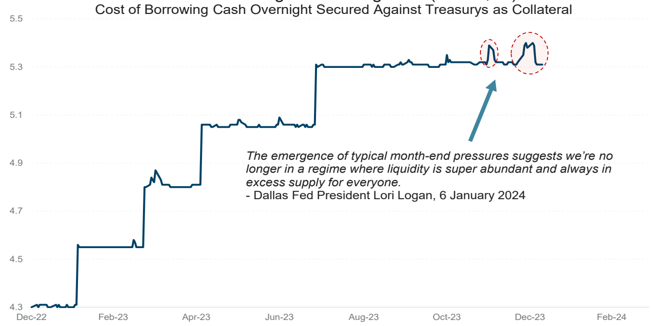
nearly all days, broad money market rates have remained well below the interest rate on reserves.

These pressures are depicted in exhibit 5.

Exhibit 5

Secured Overnight Financing Rate (SOFR, %)

Cost of Borrowing Cash Overnight Secured Against Treasurys as Collateral



Sources: Bloomberg, William Blair Equity Research

Logan also noted a potential problem: "***individual banks can approach scarcity before the system as a whole***."

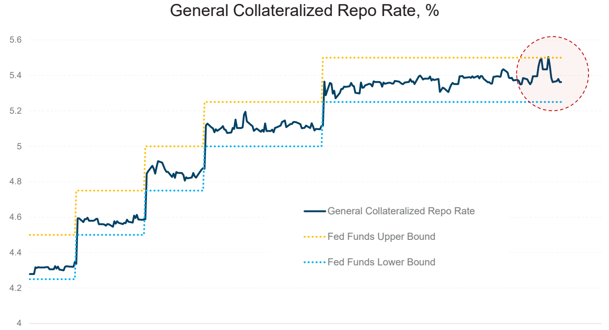
That is to say, **reserves are not equally distributed across the system; in fact, the data shows a heavy skew toward the largest banks.** And as we know, a crisis at one bank can lead to crises in others.

While Logan believes there are more than enough reserves in the system today, she also warns that "*there will be more uncertainty about aggregate liquidity conditions as ON RRP balances approach zero.*"

She further points out that this is when banks will need to reallocate reserves among themselves, from the haves to the have-nots. The recent volatility in the SOFR rate (and the GC repo rate, exhibit 6) suggests cracks are already starting to show.

Exhibit 6

General Collateralized Repo Rate, %



Sources: Bloomberg, William Blair Equity Research

Furthermore, Logan highlights that another gauge of potential future stress in the system is the survey data from the Fed's biannual Senior Financial Officer Survey.

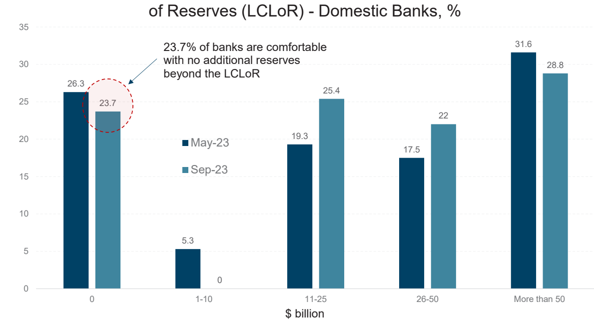
This report contains stats on the level of reserves and excess reserves that banks hold and the minimum level they would be comfortable with—the lowest comfortable level of reserves (LCLoR). LCLoR is defined as:

the lowest dollar level of reserve balances [the] bank would feel comfortable holding before it began taking active steps to maintain or increase its reserve balances. "Active steps" could include, but are not limited to, borrowing in the federal funds or other wholesale funding markets or bidding more aggressively in those markets, reducing holdings of other liquid assets, or raising deposit rates.

Based on the latest September 2023 survey results, **23.7% of banks do not feel the need to hold any reserves in excess of LCLoR** (exhibit 7). This should be taken as an indication of a lack of a buffer being held by these banks, and a reason for the Fed to be more sensitive to what is happening in this market.

Exhibit 7

Additional Reserves as Percent Share of Lowest Comfortable Level of Reserves (LCLoR) - Domestic Banks, %



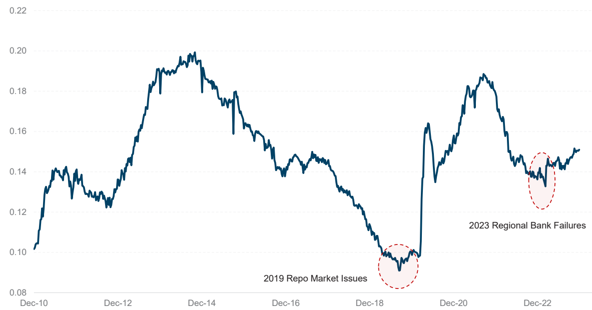
Sources: Federal Reserve, William Blair Equity Research

Lastly, we can also look at the ratio of cash assets on commercial banks' balance sheets to total assets—a measure of bank liquidity.

In 2019, this ratio fell to 0.09, before the repo market blew up. The addition of the SRF should provide more stability, though increased regulations and improved economic growth are consistent with a higher ratio. A survey of banks seem consistent with a minimum ratio of around 0.1 today, suggesting banks still have a significant cash buffer for the time being.

Exhibit 8

Cash* Assets at Commercial Banks to Total Assets Ratio



*Includes vault cash, cash items in process of collection, balances due from depository institutions, and balances due from Federal Reserve Banks.
Sources: Federal Reserve, William Blair Equity Research

In light of these data points, Logan believes that the best response would be to "*slow the pace of runoff as ON RRP balances approach a low level. Normalizing the balance sheet more slowly can actually help get to a more efficient balance sheet in the long run by smoothing redistribution and reducing the likelihood that we'd have to stop prematurely.*"

This does not mean, as the market seemed to have felt earlier when the minutes to the FOMC meeting were released, that the Fed will now end QT ASAP, but it does suggest a go-slower approach as signs emerge that liquidity in the system is tightening.

Conclusion

The problem with transitioning from a corridor to a floor system to manage the main policy interest rates for the Fed is that there have to be "ample" reserves in the system for the process to work effectively and smoothly.

The difficulty, of course, is knowing just the right level of reserves needed. In hoping to avoid the obvious method of simply waiting until something breaks in the financial markets—effectively what happened in 2019 with the repo market blowing up—the Fed is looking at a number of different gauges, including the size of reserve balances relative to GDP, which unfortunately is not an overly sensitive measure.

Dallas Fed President Lorie Logan has also fleshed out her thinking on this, suggesting a more fine-tuned approach should include watching volatility in the SOFR and GC repo rates. The recent volatility here suggests liquidity is less plentiful than it has been since the Fed flooded the system following the pandemic, but still not tight. As a precaution, she proposes the Fed start to modestly reduce the rate of QT.

In slowing the balance sheet process and not being forced to do it via a market event, the Fed should be able to achieve greater balance sheet reduction over the longer term than would be the case otherwise.

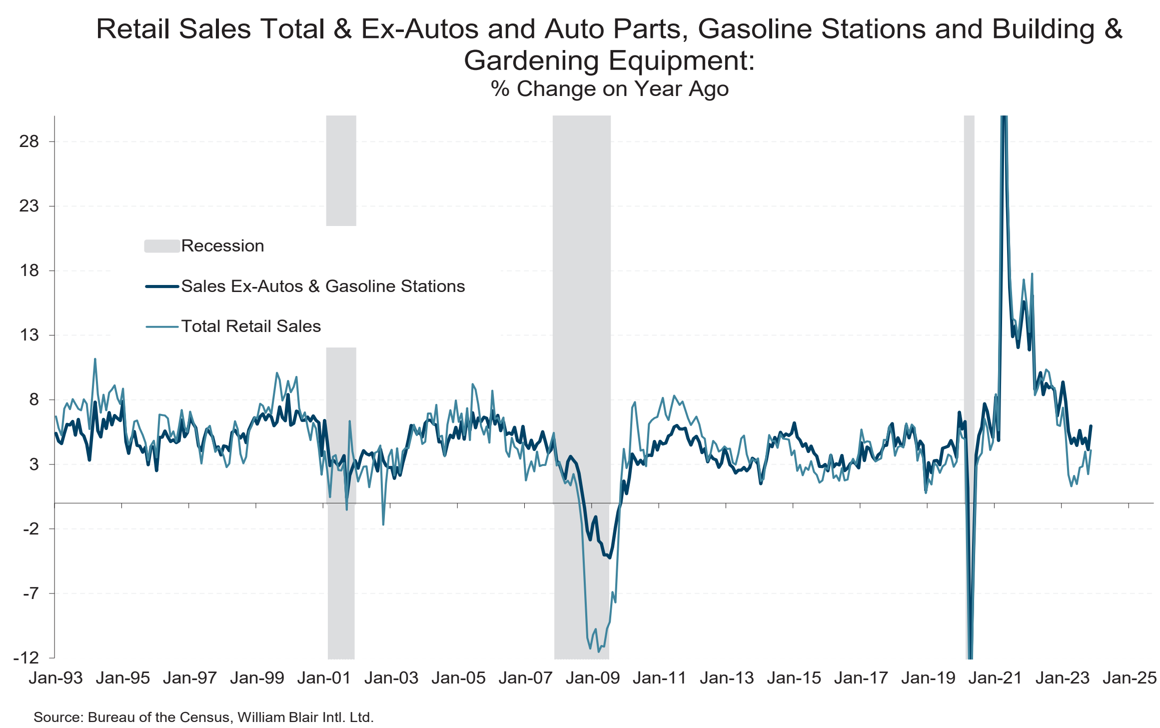
Hence, despite the seemingly only modest amount of balance sheet reduction that has taken place relative to the $5 trillion expansion since 2019, in the coming FOMC meetings and Fed speeches, we should expect further discussion around this topic. The recent rhetoric from Logan and supporting data would be consistent with the start of slowing QT in the coming months and possibly ending it entirely by year-end—conveniently also when Janet Yellen will be thinking about reversing the Treasury's "Operation Twist" and switching back to greater coupon debt issuance as opposed to T-bill issuance.

Highlights in the Week Ahead

Date	Time (EDT)	Indicator	Last	Consensus	WB Estimate	Actual
17 Jan	8:30 a.m.	Advance Retail Sales (Dec)	0.3%	0.4%	0.3%	
		Sales Less-autos	0.2%	0.2%	0.2%	
17 Jan	9:15 a.m.	Industrial Production (Dec)	0.2%	-0.1%	-0.1%	
		Capacity Utilization	78.8%	78.6%	78.5%	
17 Jan	2:00 p.m.	Fed's Beige Book				
18 Jan	8:30 a.m.	Housing Starts (Dec)	14.8%	-9.2%	-11.2%	
		Building Permits	-12.8%	-5.0%	-4.0%	
19 Jan	10:00 a.m.	Existing Home Sales (Dec)	0.8%	0.5%	0.3%	

Sources: Bloomberg, William Blair Equity Research

Indicator of the Week: Advance Retail Sales



Economic Scorecard

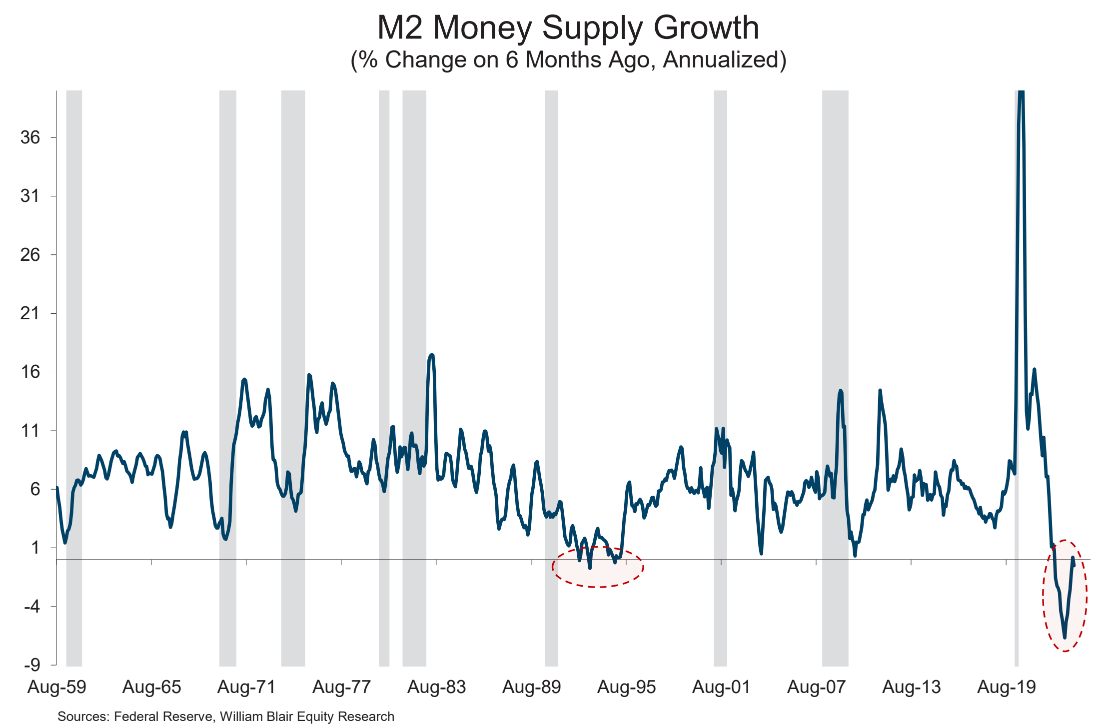
Rolling monthly heat map, % Change on Year Ago (unless otherwise noted)

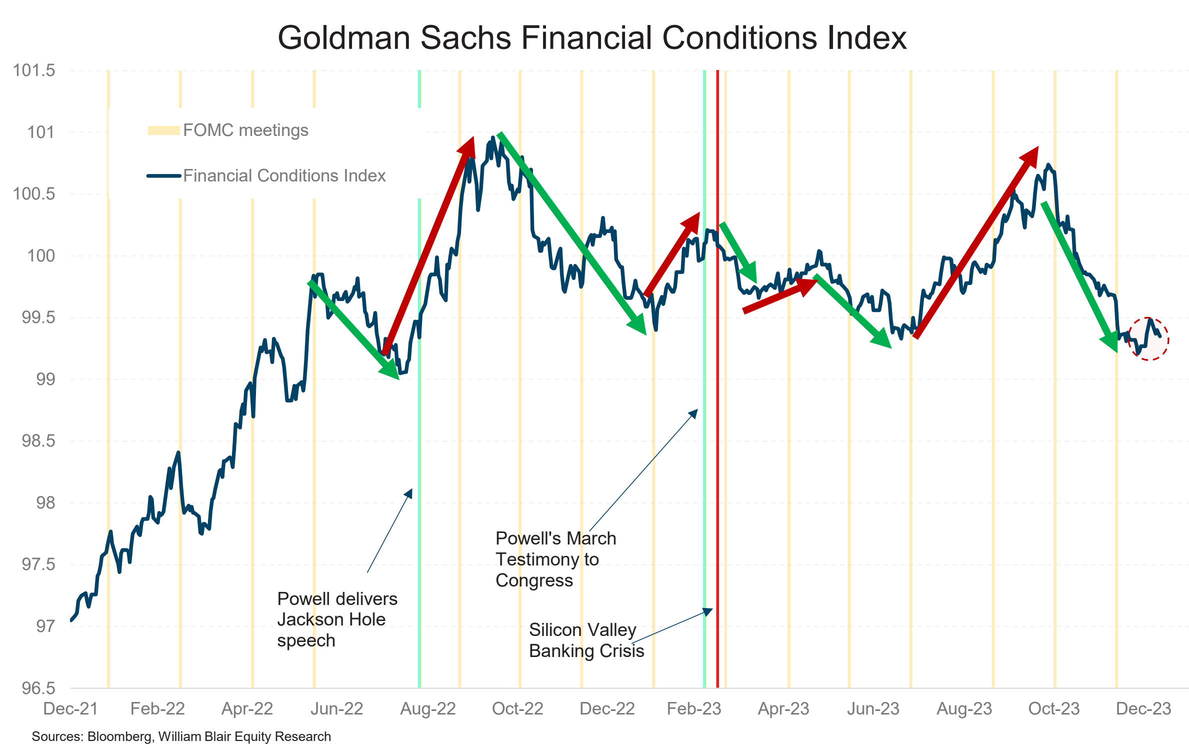
	Jul-22	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23	Nov-23	Dec-23	Jan-24
Growth																			
US Leading Indicators	-0.3	-1.1	-1.6	-3.2	-4.6	-6.0	-6.0	-6.8	-7.9	-8.1	-7.9	-7.9	-7.6	-7.7	-7.9	-8.0	-7.6		
US Coincident Indicators	2.0	2.2	2.4	1.9	1.4	1.5	1.5	1.3	1.4	1.3	1.7	1.8	1.7	1.5	1.6	1.5	1.7		
US Lagging Indicators	6.6	7.4	7.5	7.4	7.6	7.5	6.7	6.7	5.6	5.0	3.9	3.0	2.5	2.0	1.1	1.2	1.3		
Consumer																			
Total Retail Sales	10.4	10.1	9	8.9	6.1	6	7.4	5.3	2.2	1.3	2.1	1.5	2.8	2.8	4	2.2	4.1		
Personal Income	3.6	3.9	5.1	4.9	4.6	4.5	5.8	5.7	5.8	5.7	5.6	5.4	4.8	4.8	4.6	4.3	4.6		
Real Disposable Personal Income	-4.3	-3.8	-2.3	-2	-1.6	-0.9	3.2	3.5	4.4	4.5	5	5.3	4.3	4	3.8	3.9	4.3		
Real Personal Consumption	1.9	1.8	1.9	1.4	0.9	1.3	2.3	2.3	1.7	1.6	1.8	2.1	2.5	2	2.1	2	2.7		
Personal Saving Rate (%)	3.5	3.2	3	3	3.3	3.4	4.4	4.7	5.2	5.2	5.3	4.8	4.4	4.4	3.8	4	4.1		
Consumer Confidence (Conference Board)**	95.3	103.6	107.8	102.2	101.4	109	106	103.4	104	103.7	102.5	110.1	114	108.7	104.3	99.1	101	110.7	
Employment																			
Employment Growth	4.4	4.2	4.0	3.7	3.4	3.2	3.3	2.8	2.7	2.6	2.6	2.4	2.2	2.1	2.0	1.8	1.8	1.8	
ASA Temporary Staffing Index	9.3	9.3	5.4	1.1	0.2	1.0	-2.1	-6.1	-6.5	-6.8	-5.9	-6.6	-4.7	-4.8	-5.5	-7.5	-7.6	-5.5	
ISM Employment Index Manufacturing*	49.8	54.2	49.3	49.9	48.9	50.8	50.6	49.1	46.9	50.2	51.4	48.1	44.4	48.5	51.2	46.8	45.8	48.1	
ISM Employment Index Services*	49.5	50.2	52.3	49.2	50.6	49.4	50	54	51.3	50.8	49.2	53.1	50.7	54.7	53.4	50.2	50.7	43.3	
Unemployment Rate, %	3.5	3.6	3.5	3.6	3.6	3.5	3.4	3.6	3.5	3.4	3.7	3.6	3.5	3.8	3.8	3.8	3.7	3.7	
Average Hourly Earnings	5.4	5.4	5.1	4.9	5	4.8	4.4	4.7	4.3	4.4	4.3	4.4	4.3	4.3	4.2	4.1	4	4.1	
Initial Jobless Claims (avg. wkly. chg. '000s)	216	210	191	202	213	209	200	219	238	239	230	254	228	238	209	211	220	208	
Jop Openings	4.6	-7.0	-0.3	-7.9	-4.3	-5.0	-8.0	-14.0	-19.0	-12.2	-16.0	-16.4	-21.6	-6.9	-13.9	-15.5	-18.2		
Layoff Announcements	36.3	30.3	67.6	48.3	416.5	129.1	440	410.1	319.4	175.9	286.7	25.2	-8.2	266.9	58.2	8.8	-40.8		
Housing Market																			
Housing Starts	-13.9	-4.5	-6.2	-8.9	-16.6	-24.1	-19.7	-18.9	-19.4	-25.2	2.6	-9.2	5.8	-13.3	-7.3	-5.1	9.3		
New Home Sales	-28.6	-7.5	-23.6	-15.1	-24.6	-23.4	-19.9	-19.1	-9.5	11.1	11.6	21.3	34.1	2.5	23.5	16.5	1.4		
Existing Home Sales	-19.9	-20.2	-24.0	-28.2	-35.2	-34.0	-36.9	-23.1	-22.1	-23.0	-20.4	-18.9	-16.6	-15.3	-15.6	-14.6	-7.3		
Median House Price (Existing Homes)	17.8	8.9	15.6	16.3	7.4	17	0.4	1.4	0.7	-8.9	-6.5	-3.5	-8.9	0.1	-10.5	-16.5	-6		
Existing Homes Inventory (Mths' supply)	2.9	3	3	3.2	3.4	3.5	3.4	2.9	2.8	2.8	2.8	2.8	2.9	3	3.3	3.5	3.7		
New Homes Inventory (Mths' supply)	10.1	8.7	9.7	9.7	9.4	8.5	8.1	8.4	8.1	7.6	7.2	7.5	7.1	7.9	7.4	7.9	9.2		
NAHB Homebuilder Sentiment*	55	49	46	38	33	31	35	42	44	45	50	55	56	50	44	40	34	37	
Inflation																			
Consumer Price Index	8.5	8.3	8.2	7.7	7.1	6.5	6.4	6	5	4.9	4	3	3.2	3.7	3.7	3.2	3.1	3.4	
CPI Less-food & energy	5.9	6.3	6.6	6.3	6	5.7	5.6	5.5	5.6	5.5	5.3	4.8	4.7	4.3	4.1	4	4	3.9	
Producer Price Index	9.7	8.7	8.5	8.2	7.4	6.4	5.7	4.7	2.7	2.3	1.1	0.3	1.1	1.9	2	1.2	0.9		
PPI Less-food & energy	7.6	7.2	7.2	6.9	6.3	5.7	5	4.6	3.3	3.1	2.8	2.5	2.7	2.5	2.6	2.3	2		
PCE Price Index	6.6	6.5	6.6	6.3	5.9	5.4	5.5	5.2	4.4	4.4	4	3.2	3.3	3.3	3.4	2.9	2.6		
PCE Prices Less-food & energy	5.0	5.2	5.5	5.3	5.1	4.9	4.9	4.8	4.8	4.8	4.7	4.3	4.2	3.7	3.6	3.4	3.2		
Business Activity - US																			
Industrial Production	3.0	3.1	4.5	3.1	1.9	0.6	1.5	0.9	0.2	0.4	0.1	-0.4	0.1	0.0	-0.2	-1.0	-0.4		
New Cap Gds Orders less-aircraft & parts	6.3	8.2	5.6	5	3.2	1	5.6	2.7	1.9	1	3.2	1.4	0.4	0.6	0.5	0.8	1.5		
Business Inventories	20.6	19.8	19.5	18.3	16.9	15.1	12.6	10.7	8.8	6.2	5.2	3.3	1.8	1.4	1	1	0.6		
ISM Manufacturing PMI*	52.7	52.9	51	50	49	48.4	47.4	47.7	46.3	47.1	46.9	46	46.4	47.6	49	46.7	46.7	47.4	
Markit US Manufacturing PMI*	52.2	51.5	52	50.4	47.7	46.2	46.9	47.3	49.2	50.2	48.4	46.3	49	47.9	49.8	50	49.4	47.9	
ISM Services Index*	56.4	56.1	55.9	54.5	55.5	49.2	55.2	55.1	51.2	51.9	50.3	53.9	52.7	54.5	53.6	51.8	52.7	50.6	
Markit US Services PMI*	47.3	43.7	49.3	47.8	46.2	44.7	46.8	50.6	52.6	53.6	54.9	54.4	52.3	50.5	50.1	50.6	50.8	51.4	
Business Activity - International																			
Germany Manufacturing PMI Markit/BME*	49.3	49.1	47.8	45.1	46.2	47.1	47.3	46.3	44.7	44.5	43.2	40.6	38.8	39.1	39.6	40.8	42.6	43.3	
Japan Manufacturing PMI Jibun Bank*	52.1	51.5	50.8	50.7	49	48.9	48.9	47.7	49.2	49.5	50.6	49.8	49.6	49.6	48.5	48.7	48.3	47.9	
Caixin China Manufacturing PMI*	50.4	49.5	48.1	49.2	49.4	49	49.2	51.6	50	49.5	50.9	50.5	49.2	51	50.6	49.5	50.7	50.8	
China Manufacturing PMI*	49	49.4	50.1	49.2	48	47	50.1	52.6	51.9	49.2	48.8	49	49.3	49.7	50.2	49.5	49.4	49	
UK Manufacturing PMI Markit/CIPS*	52.1	47.3	48.4	46.2	46.5	45.3	47	49.3	47.9	47.8	47.1	46.5	45.3	43	44.3	44.8	47.2	46.2	
France Manufacturing PMI Markit*	49.5	50.6	47.7	47.2	48.3	49.2	50.5	47.4	47.3	45.6	45.7	46	45.1	46	44.2	42.8	42.9	42.1	
Currencies*																			
Euro (EUR/USD)	-13.9	-14.9	-15.4	-14.5	-8.2	-5.8	-3.3	-5.7	-2.1	4.5	-0.4	4.1	7.6	7.8	7.9	7.0	4.6	3.1	
Renmimbi (USD/CNY)	4.4	6.7	10.4	14.0	11.4	8.5	6.2	9.9	8.4	4.7	6.5	8.3	5.9	5.3	2.6	0.2	0.6	2.9	
Yen (USD/Yen)	21.5	26.3	30.1	30.5	22.0	13.9	13.0	18.4	9.2	5.1	8.3	6.3	6.8	4.7	3.2	2.0	7.3	7.6	
Sterling (GBP/USD)	-12.5	-15.5	-17.1	-16.2	-9.3	-10.7	-8.4	-10.4	-6.1	-0.1	-1.3	4.3	5.5	9.0	9.2	6.0	4.7	5.4	
Canadian $ (USD/CAD)	2.6	4.1	9.1	10.0	5.0	7.3	4.7	7.7	8.1	5.5	7.3	2.9	3.1	2.9	-1.8	1.8	1.1	-2.3	
Mexican Peso (USD/MXN)	2.5	0.3	-2.4	-3.7	-10.2	-5.0	-8.7	-10.6	-9.2	-11.9	-10.0	-14.9	-17.8	-15.4	-13.5	-8.9	-9.8	-13.0	
US Equities																			
S&P 500	-6.0	-12.6	-16.8	-15.9	-10.7	-19.4	-9.7	-9.2	-9.3	0.9	1.2	17.6	11.1	14.0	19.6	8.3	12.0	24.2	
S&P 400 Midcap	-7.1	-11.7	-16.6	-12.9	-4.8	-14.5	0.7	-2.3	-6.7	-0.4	-4.3	15.6	8.6	8.8	13.6	-2.7	-0.5	14.4	
S&P 600 Smallcap	-7.6	-13.4	-20.0	-13.1	-7.4	-17.4	-2.5	-5.1	-10.4	-5.5	-8.9	7.8	3.4	3.6	8.1	-9.3	-5.9	13.9	
Russell 2000	-15.3	-18.9	-24.5	-19.6	-14.2	-21.6	-4.8	-7.4	-12.9	-5.1	-6.1	10.6	6.3	3.0	7.2	-10.0	-4.1	15.1	

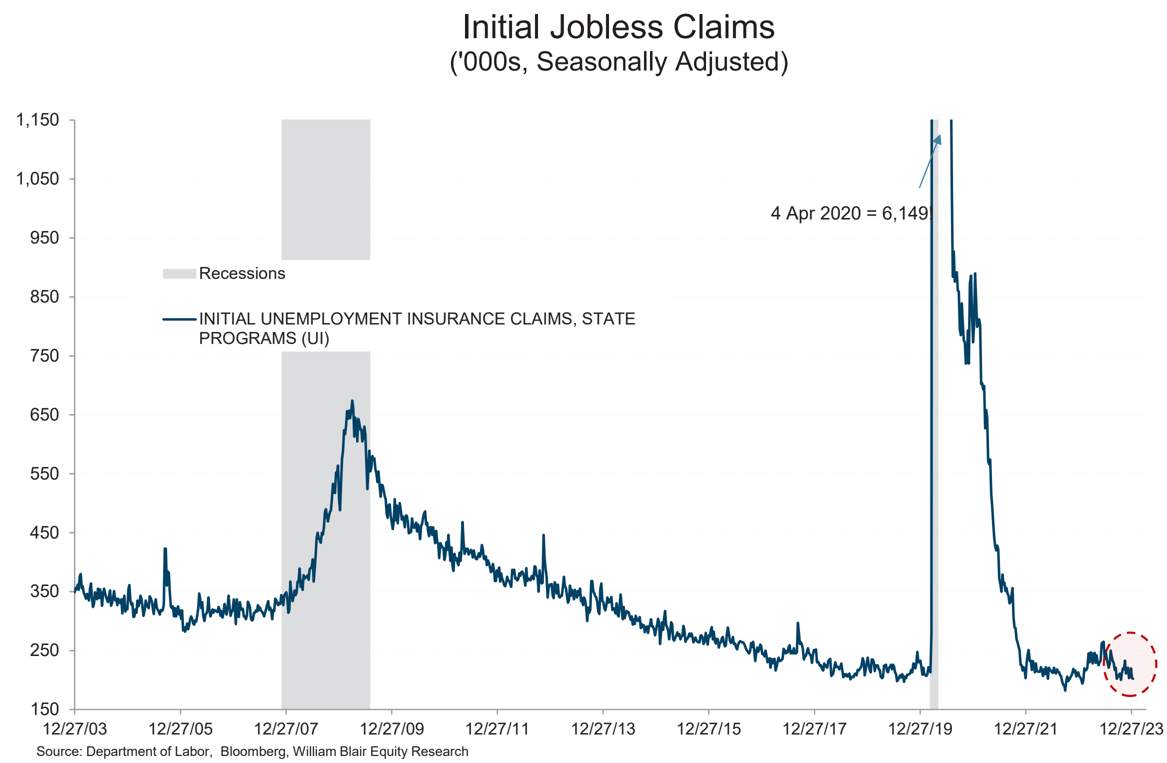
* Diffusion Index, **1985=100, ***Currencies - green/red = strengthening/weakening foreign currency vs dollar

Source: ISM, Federal Reserve, Census Bureau, Bureau of Labor Statistics, Conference Board, Bloomberg, William Blair

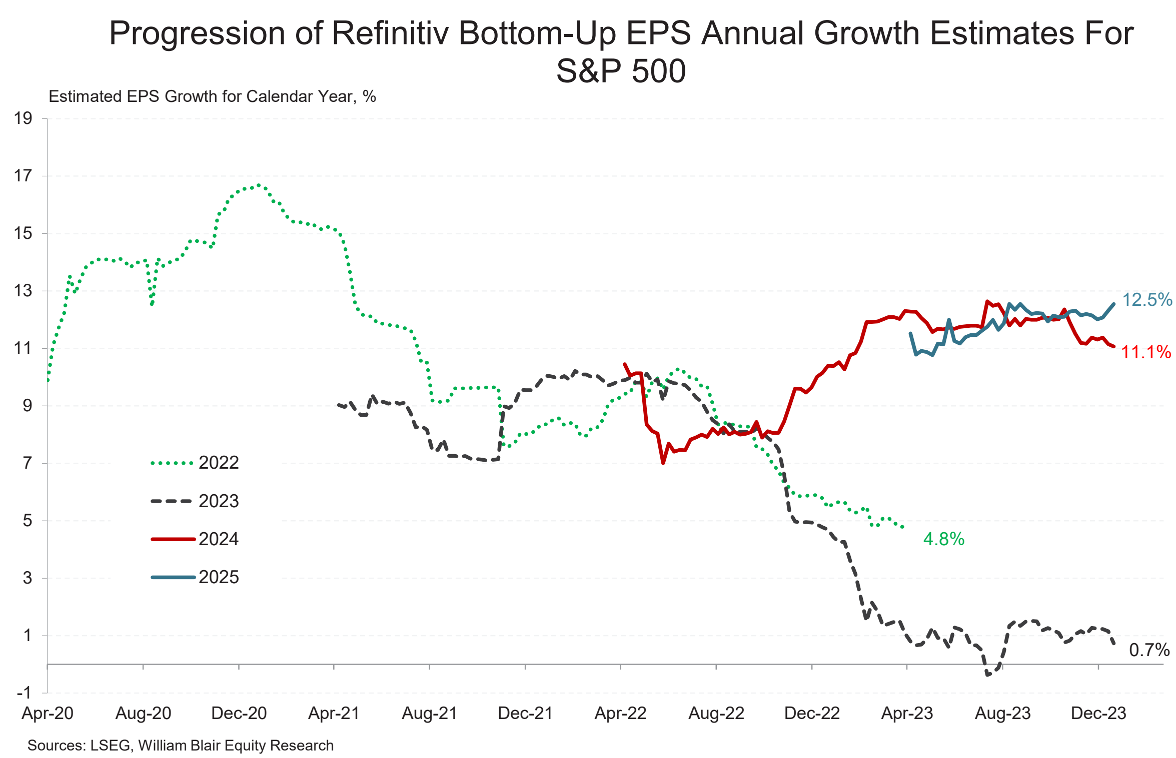
Other Economic Indicators



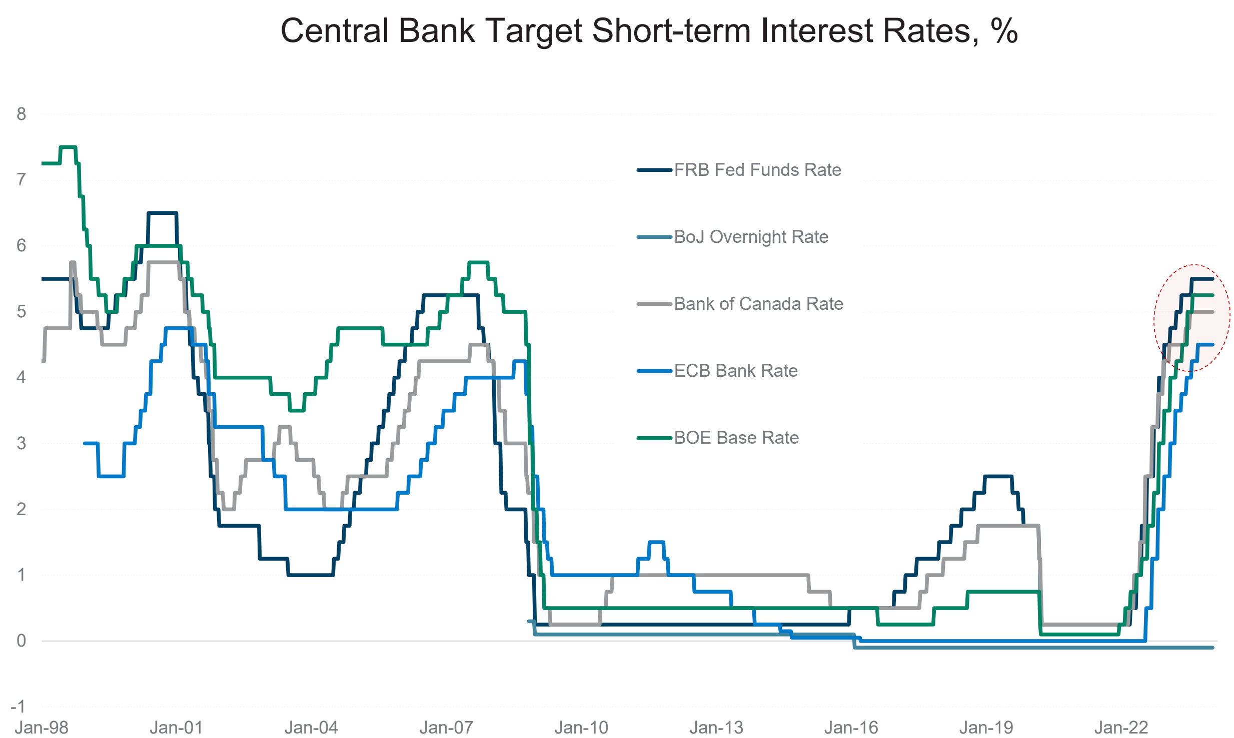




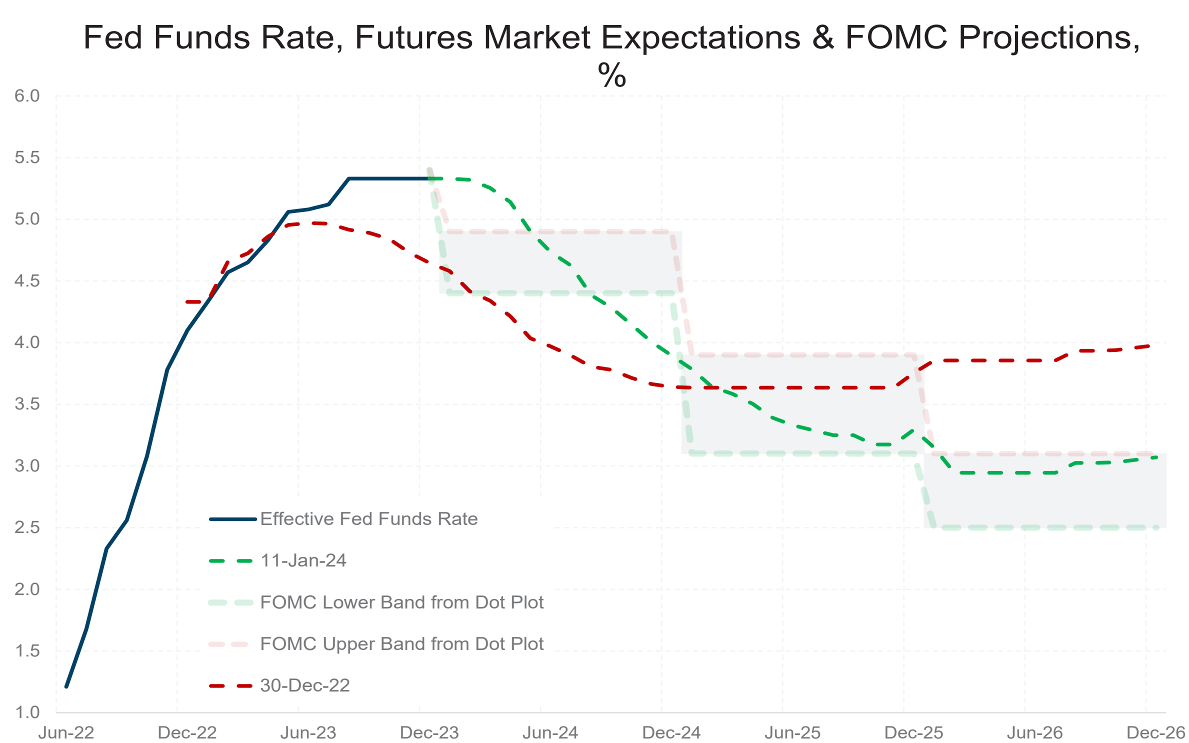
Initial Jobless Claims
('000s, Seasonally Adjusted)
1,150
1,050
950
850
750
650
550
450
350
250
150
Recessions
INITIAL UNEMPLOYMENT INSURANCE CLAIMS, STATE PROGRAMS (UI)
4 Apr 2020 = 6,149
12/27/03
12/27/05
12/27/07
12/27/09
12/27/11
12/27/13
12/27/15
12/27/17
12/27/19
12/27/21
12/27/23
Source: Department of Labor, Bloomberg, William Blair Equity Research



Progression of Refinitiv Bottom-Up EPS Annual Growth Estimates For S&P 500
Estimated EPS Growth for Calendar Year, %
19
17
15
13
11
9
7
5
3
1
-1
2022
2023
2024
2025
12.5%
11.1%
4.8%
0.7%
Apr-20
Aug-20
Dec-20
Apr-21
Aug-21
Dec-21
Apr-22
Aug-22
Dec-22
Apr-23
Aug-23
Dec-23
Sources: LSEG, William Blair Equity Research



Sources: Bloomberg, William Blair Equity Research



Sources: Bloomberg, William Blair Equity Research

S&P 500 Sector Performance

Global Industry Classification System	Current Weight* 11-Jan-24	Week Ago 04-Jan-24	Month Ago 11-Dec-23	Qtr-to-Date 29-Dec-23	Year-to-Date 29-Dec-23
S&P 500 Index	**100.00**	**1.95**	**3.41**	**0.22**	**0.22**
S&P400 MidCap Index		**0.98**	**3.20**	**-1.83**	**-1.83**
S&P600 SmallCap Index		**-0.14**	**3.75**	**-3.46**	**-3.46**
Dow Jones Industrials		**0.72**	**3.59**	**0.06**	**0.06**
Nasdaq Composite		**3.17**	**3.73**	**-0.27**	**-0.27**
Communication Services	**8.98**	**3.15**	**6.36**	**1.61**	**1.61**
Advertising	0.07	3.16	4.71	1.58	1.58
Broadcasting	0.05	-1.43	-5.12	-1.45	-1.45
Cable & Satellite	0.55	0.84	0.84	-2.07	-2.07
Integrated Telecommunication Services	0.66	-4.43	-0.65	-1.10	-1.10
Interactive Home Entertainment	0.15	1.47	2.09	0.54	0.54
Interactive Media & Services	5.98	4.93	8.98	2.71	2.71
Movies & Entertainment	1.02	1.02	1.90	-0.33	-0.33
Publishing & Printing	0.03	-0.07	9.76	-1.35	-1.35
Wireless Telecommunication Svcs	0.45	-0.08	2.09	1.15	1.15
Consumer Discretionary	**11.13**	**2.89**	**2.45**	**-0.94**	**-0.94**
Apparel Retail	0.37	2.19	3.76	0.71	0.71
Apparel & Accessories & Luxury Goods	0.19	-1.34	-1.54	-4.35	-4.35
Auto Parts & Equipment	0.08	-0.17	3.37	-6.36	-6.36
Automobile Manufacturers	1.96	-3.85	-3.85	-7.75	-7.75
Automobile Retail	0.27	0.30	-1.77	-1.56	-1.56
Broadline Retail	3.92	7.11	6.12	1.95	1.95
Casinos & Gaming	0.18	-0.85	3.72	-0.52	-0.52
Computer & Electronics Retail	0.04	-0.86	0.69	-4.64	-4.64
Consumer Electronics	0.06	-0.51	-1.61	-4.17	-4.17
Distributors	0.11	2.00	4.17	-1.56	-1.56
Footwear	0.31	3.52	-10.72	-2.46	-2.46
Home Furnishings	0.02	3.72	13.59	0.93	0.93
Home Improvement Retail	1.15	5.02	7.37	1.81	1.81
Homebuilding	0.33	5.60	11.08	2.96	2.96
Hotels, Resorts & Cruise Lines	0.90	3.50	2.89	-0.44	-0.44
Household Appliances	0.02	1.86	9.61	-1.16	-1.16
Leisure Products	0.02	2.35	1.25	-3.06	-3.06
Restaurants	1.08	0.65	-0.40	-1.42	-1.42
Other Specialty Retail	0.14	2.34	2.83	0.60	0.60
Consumer Staples	**6.73**	**0.57**	**3.20**	**0.84**	**0.84**
Agricultural Products	0.13	-3.31	-7.96	-4.30	-4.30
Brewers	0.03	3.90	1.32	4.07	4.07
Hypermarkets	2.06	2.58	8.02	1.37	1.37
Distillers & Vintners	0.15	4.82	6.90	4.53	4.53
Drug Retail	0.05	-0.95	4.48	-7.97	-7.97
Food Distributors	0.09	0.44	2.06	3.17	3.17
Food Retail	0.08	-0.11	1.69	0.31	0.31
Household Products	1.21	1.16	3.23	2.35	2.35
Packaged Foods & Meats	0.80	-1.12	0.79	-0.14	-0.14
Personal Products	0.18	2.52	4.74	-1.57	-1.57
Soft Drinks	1.42	-1.27	0.44	-0.43	-0.43
Tobacco	0.53	-0.29	1.71	1.79	1.79
Energy	**3.74**	**-3.54**	**-0.01**	**-2.52**	**-2.52**
Integrated Oil & Gas	1.73	-3.56	-0.31	-1.96	-1.96
Oil & Gas Equipment & Services	0.39	-5.49	-1.77	-6.67	-6.67
Oil & Gas Exploration & Production	0.97	-4.24	-1.19	-3.88	-3.88
Oil & Gas Refining & Marketing & Transportation	0.38	-1.38	5.01	0.46	0.46
Oil & Gas Storage & Transportation	0.34	-1.86	1.14	-0.40	-0.40

Financials	**12.54**	**0.22**	**3.92**	**0.03**	**0.03**
Asset Management & Custody Banks	0.89	0.01	5.82	-2.92	-2.92
Consumer Finance	0.55	-0.66	8.89	-1.37	-1.37
Diversified Banks	2.89	-1.02	7.28	-0.33	-0.33
Financial Exchanges & Data	1.13	0.03	1.52	-2.88	-2.88
Insurance Brokers	0.60	2.02	-4.65	2.37	2.37
Investment Banking & Brokerage	0.99	-1.52	6.31	-2.96	-2.96
Life & Health Insurance	0.40	0.80	2.38	1.24	1.24
Multi-line Insurance	0.13	-1.87	1.24	-0.75	-0.75
Multi-Sector Holdings	1.14	-0.09	1.76	1.87	1.87
Property & Casualty Insurance	0.91	1.27	2.82	3.59	3.59
Regional Banks	0.31	0.14	6.98	-0.62	-0.62
Reinsurance	0.04	1.81	-4.19	5.88	5.88
Transaction & Payment Processing	2.56	2.04	3.15	1.06	1.06
Health Care	**12.93**	**1.16**	**6.31**	**3.28**	**3.28**
Biotechnology	2.06	0.71	10.55	4.93	4.93
Health Care Distributors	0.35	2.39	4.77	5.12	5.12
Health Care Equipment	2.46	3.61	7.65	2.74	2.74
Health Care Facilities	0.20	3.54	8.20	4.31	4.31
Health Care Services	0.57	-0.95	3.97	0.85	0.85
Health Care Supplies	0.11	4.41	18.32	0.99	0.99
Life Sciences Tools & Services	1.42	0.36	6.36	-0.95	-0.95
Managed Health Care	1.76	-0.79	-0.15	2.59	2.59
Pharmaceuticals	4.00	1.11	6.55	4.96	4.96
Industrials	**8.64**	**0.82**	**2.44**	**-1.54**	**-1.54**
Aerospace & Defense	1.61	-2.04	-1.23	-3.68	-3.68
Agricultural & Farm Machinery	0.26	-0.55	8.09	-2.41	-2.41
Air Freight & Logistics	0.49	1.26	-0.60	0.39	0.39
Building Products	0.49	2.80	3.33	-0.19	-0.19
Construction & Engineering	0.07	1.20	0.35	-6.18	-6.18
Construction Machinery & Heavy Trucks	0.61	1.69	6.64	-1.43	-1.43
Data Processing & Outsourced Services	0.06	2.09	5.30	-2.21	-2.21
Diversified Support Svcs	0.25	1.69	1.58	-2.40	-2.40
Electrical Components & Equipment	0.60	2.06	4.82	-0.69	-0.69
Environmental & Facilities Services	0.39	0.23	2.32	-1.13	-1.13
Human Resource & Employment Services	0.41	0.75	-0.83	-0.27	-0.27
Industrial Conglomerates	0.80	1.19	4.51	-0.92	-0.92
Industrial Machinery	0.83	0.26	2.56	-2.13	-2.13
Passenger Airlines	0.17	8.50	5.34	5.33	5.33
Railroads	0.63	-1.55	2.50	-2.96	-2.96
Research & Consulting Svcs	0.23	1.51	1.11	-0.85	-0.85
Trading Companies & Distributors	0.28	1.65	3.80	-1.69	-1.69
Information Technology	**28.69**	**4.65**	**2.70**	**0.26**	**0.26**
Application Software	2.55	5.18	1.35	-0.13	-0.13
Communications Equipment	0.86	3.02	3.44	1.92	1.92
Electronic Components	0.20	1.78	2.08	-1.69	-1.69
Electronic Equipment & Instruments	0.18	1.04	5.15	-3.78	-3.78
Electronic Manufacturing Services	0.14	0.74	-1.55	-3.96	-3.96
Internet Software & Services	0.09	2.49	-1.44	-0.99	-0.99
IT Consulting & Services	1.13	2.38	0.96	-0.83	-0.83
Semiconductor Equipment	0.80	2.51	1.33	-4.84	-4.84
Semiconductors	7.21	8.06	10.27	2.75	2.75
Systems Software	8.30	4.85	3.11	2.41	2.41
Technology Distributors	0.07	2.83	2.53	-2.71	-2.71
Technology Hardware, Storage & Peripherals	7.13	1.95	-3.83	-3.56	-3.56
Materials	**2.30**	**-0.97**	**1.58**	**-2.58**	**-2.58**
Commodity Chemicals	0.16	-1.18	3.64	-1.49	-1.49
Construction Materials	0.15	2.00	3.97	-0.74	-0.74
Copper	0.14	-1.25	8.34	-3.62	-3.62
Fertilizers & Agricultural Chemicals	0.16	-3.65	0.55	-4.02	-4.02
Gold	0.10	-6.49	-3.48	-9.35	-9.35
Industrial Gases	0.61	-0.98	-0.43	-1.67	-1.67

Metal & Glass Containers	0.04	-0.02	-1.63	-1.53	-1.53
Paper Packaging	0.16	1.10	2.08	1.11	1.11
Specialty Chemicals	0.63	-0.06	2.58	-3.14	-3.14
Steel	0.14	-2.44	1.11	-3.61	-3.61
Real Estate	**2.41**	**-0.34**	**3.65**	**-2.04**	**-2.04**
Data Center REITs	0.28	1.09	0.12	-0.50	-0.50
Health Care REITs	0.19	0.65	2.94	-0.75	-0.75
Hotel & Resort REITs	0.03	0.76	9.47	1.95	1.95
Industrial REITs	0.29	0.80	7.64	-1.48	-1.48
Multi-Family Residential REITs	0.00	1.07	6.54	-0.41	-0.41
Office REITs	0.08	0.44	6.62	-0.59	-0.59
Real Estate Service	0.14	-0.83	0.06	-7.28	-7.28
Retail REITs	0.30	1.73	6.07	0.70	0.70
Self-Storage REITs	0.20	-3.55	6.59	-5.29	-5.29
Single-Family Residential REITs	0.20	-3.55	6.59	-5.29	-5.29
Telecom Tower REITs	0.41	-3.02	-0.08	-3.63	-3.63
Timber REITs	0.06	0.77	8.92	-2.65	-2.65
Utilities	**2.23**	**-2.07**	**-0.58**	**-0.65**	**-0.65**
Electric Utilities	1.47	-1.98	-0.21	-0.58	-0.58
Gas Utilities	0.04	-1.88	1.83	-0.44	-0.44
Independent Power Producers & Energy Traders	0.03	-4.46	-0.12	-6.33	-6.33
Water Utilities	0.06	-0.18	0.63	-0.35	-0.35
Multi-Utilities	0.63	-2.38	-1.74	-0.61	-0.61

*Current Weight is market cap based, based on calculations by William Blair Intl. Ltd.

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DOW JONES: 37711.00
S&P 500: 4780.24
NASDAQ: 14970.20

Additional information is available upon request.

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Coverage Universe	Percent	Inv. Banking Relationships *	Percent
Outperform (Buy)	70	Outperform (Buy)	8
Market Perform (Hold)	30	Market Perform (Hold)	3
Underperform (Sell)	1	Underperform (Sell)	0

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