William Blair

Equity Research
Economics

April 5, 2024

Richard de Chazal, CFA

Economics Weekly

What Gold, Copper, and Treasury Are Telling Us About Growth and Inflation

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

Thus far this year and particularly since the start of March, the price of gold has been hitting new highs simultaneously with bond yields rising. This relatively synchronized rise is curious because it has not been the norm for the last quarter century. Rather, from around 2000 onward, there had been a negative correlation between the direction of bond yields and the price of gold (or positive correlation between Treasury total returns and gold's return). Yet, the move over the course of this year has been significant enough that it has justified the question of whether something fundamental has changed and what might be causing it. **We discuss the current synchronization in this *Economics Weekly*, along with the price of gold relative to copper and what it might be telling us about current bond yields.**

The Positive Correlation

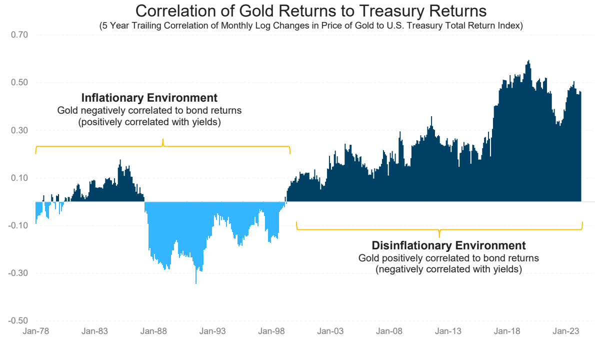
Examining the behavior of gold prices in relation to Treasury yields can be instructive as to the market's current expectations about economic growth and inflation.

It is worth highlighting from the start that the positive correlation between bond returns and gold returns has not always been the case, as shown in exhibit 1. Rather, pre-2000 the relationship was mostly negative—i.e., rising bond prices (falling yields) were associated with falling gold prices and vice versa.

Exhibit 1

Correlation of Gold Returns to Treasury Returns

(5 Year Trailing Correlation of Monthly Log Changes in Price of Gold to U.S. Treasury Total Return Index)



Sources: Bloomberg, William Blair Equity Research

Around the year 2000 is when we believe the inflation risks decisively tilted for the global economy—turning from an economy upwardly biased toward inflation to one where the major risk was increasingly tilted toward deflation.

This shift was the result of a number of factors, including: the wider adoption of technological innovation; globalization and the push toward free trade, which importantly included the signing of the NAFTA deal; and most significantly for the global economy, China's entry to the WTO. In addition, the wider success of central bankers and the adoption of inflation targets contributed to this shift.

In the central banking world, this shifting of the tectonic plates of inflation followed the heavy lifting of Fed Chair Paul Volcker, who raised interest rates and kept them there until the economy screamed and inflation came down. Then came the Greenspan world of "opportunistic disinflation," or keeping rates higher than they otherwise might be to ensure that inflation and inflationary expectations were truly crushed. This culminated in the Bernanke world, where the inflation risks were seemingly tipped on their head and it felt that *deflation* had become the No. 1 risk for the economy—perhaps best pinpointed by (at the time) Fed Governor Bernanke's 2002 speech, Deflation - making sure *it* doesn't happen here.

With inflation dead and central bankers becoming the all-powerful maestros with the keys to maintaining low inflation, investor and, more importantly, central bankers' sentiment became, "who needs this barbarous relic gold." Consequently, in a show of confidence in their own abilities, many (and most famously the Bank of England under the direction of Chancellor Gordon Brown) began to sell off their gold reserves throughout the late 1990s.

As a result, the price of gold and bond yields started to diverge. Effectively, the feeling was that if both could be viewed as safe-haven assets, and there was no more risk of elevated inflation, any rise or fall in one asset was simply doing the work of the other, making them relatively complementary or interchangeable.

Exhibit 1 shows that at its peak in 2019, the five-year trailing correlation of monthly returns between bonds and gold reached 60%. However, since then there has been tentative evidence suggesting that this relationship is starting to change.

Exhibit 2 shows the momentum of the rally in gold this year, coupled with the rise in bond yields and coming hot off the back of what has been the largest increase in inflation since 1981. This has unsurprisingly raised concerns among investors about what this is signaling and whether something fundamental may have changed.

Exhibit 2
10 Year T-Note Yield vs Gold Price

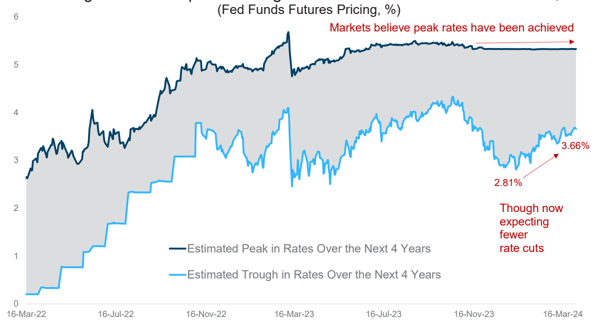
What Has Been Driving Bond Yields?

As mentioned above, gold and Treasurys both act as safe havens in times of strife. Bonds can be excellent disaster insurance against economic weakness and disinflation, while gold provides an excellent hedge again periods of more extreme inflation and currency debasement.

Looking at this year's rise of bond yields in isolation—and taking into account the fact that a bond's yield should be the sum of the yields on expected future short rates plus an inflation and term premium—we see that most of the rise in yield has been related to the backing out of previously expected cuts to short rates, rather than short rates actual rising.

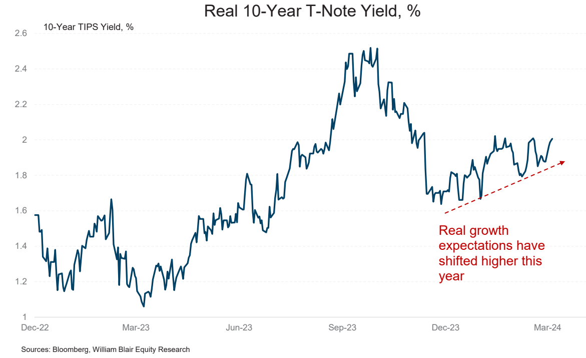
Exhibit 3, for example, shows that the futures market has been pricing in a higher floor around the expected Fed easing cycle, rather than yields continuing to increase.

Exhibit 3
Progression of Expected Range for Fed Funds Rate in Next 4 Years,
(Fed Funds Futures Pricing, %)



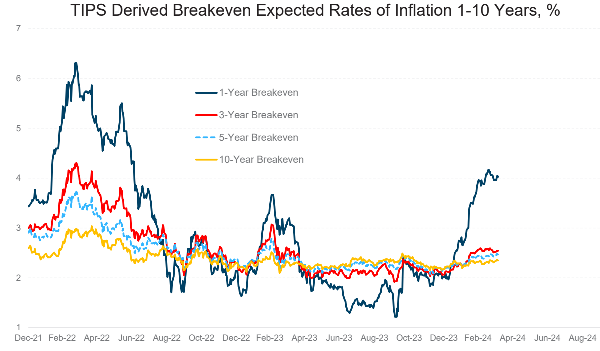
Importantly, this in turn has largely—but not entirely—been driven by a rise in the real yield (exhibit 4), due to stronger growth and the belief that the economy's longer-term productive capacity to growth has increased, as opposed to rising on the back of fears about inflation being higher on a sustained basis.

Exhibit 4
Real 10-Year T-Note Yield, %



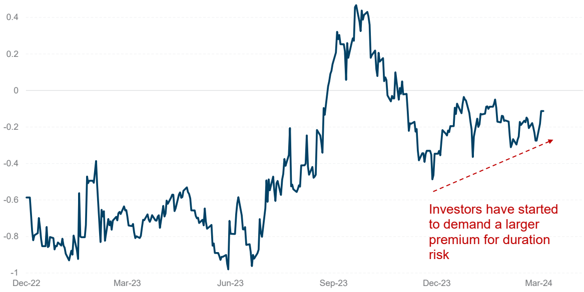
The bond market's inflationary expectations can, for example, be viewed through the behavior of TIPS breakeven spreads across various maturities. The upward move in the more volatile 1-year inflationary expectations component of yields since the start of the year has been notable, and likely reflects the fact that there has been some deterioration in the success of reducing inflation in the "last mile" to 2%. Looking a little further out, 3- to 10-year breakevens have shown very little movement, remaining very well anchored around 2.5% (exhibit 5) over the longer term.

Exhibit 5
TIPS Derived Breakeven Expected Rates of Inflation 1-10 Years, %



Meanwhile, the term premium—i.e., the extra yield demanded by investors for taking on duration risk in buying a note or a bond, as opposed to continuing to roll over T-bills for a 10- or 20-year period—has started to become less negative (exhibit 6).

Exhibit 6
Term Premium* on 10-Year T-Note Yield, %



*New York Fed's Adrian, Crump, & Moench 10 Year Term Premium estimate
Sources: Bloomberg, New York Federal Reserve, William Blair Equity Research

While rising Treasury issuance will surely be playing a role here on the supply-side, this rise is also likely due to a change in the demand structure, whereby fewer price insensitive foreign central banks are purchasing Treasurys than was the case in the past. This trend is consistent with one of the possible reasons behind the increase in the price of gold, discussed below.

What About Gold?

When it comes to breaking down the price movements of gold, life becomes a little more difficult. This is simply because gold on its own has no productive abilities; hence, it is often viewed as a lump of metal with no intrinsic value and only worth as much as the next person is willing to pay for it.

What we do know is that gold has proved to be an excellent store of value. Diamonds, for example, while easy to transport in case of need, are an artificially manipulated market and a product that can increasingly be grown and harvested. Gold conversely is an alien metal originating in outer space, hence it is surprisingly scarce, it also has multiple uses, does not tarnish, and despite the best efforts of scientists to replicate Rumpelstiltskin's magical abilities to turn straw into gold, such alchemy has remained the stuff of fairy tales.

Warren Buffet—who is well-known to be no lover of gold as an investment—previously remarked:

> *With an asset like gold, for example, you know, basically gold is a way of going long on fear, and it's been a pretty good way of going long on fear from time to time. But you really have to hope people become more afraid in the year or two years than they are now. And if they become more afraid you make money, if they become less afraid you lose money. But the gold itself doesn't produce anything.*

Sadly, this sort of fear buying may be just what we are seeing following the Russian invasion of Ukraine and renewed fighting in the Middle East. The main buyers of gold in more recent years have been the central banks of countries such as Czech Republic, Poland, and Hungary, as well as India, China, and Russia.

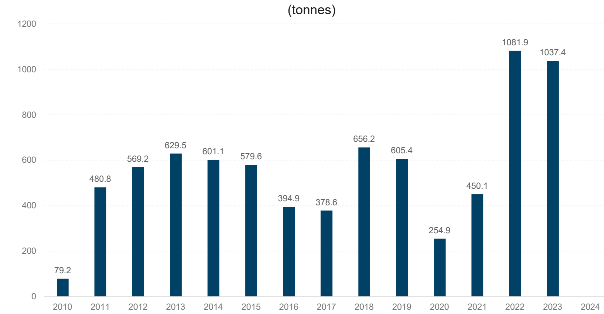
The geopolitical nature of these purchases was explicitly stated by the National Bank of Poland's Governor Adam Glapiński back in 2021, when he remarked that:

> *Gold will retain its value even when someone cuts off the power to the global financial system, destroying traditional assets based on electronic accounting records. Of course, we do not assume that this will happen. But as the saying goes—forewarned is always insured. And the central bank is required to be prepared for even the most unfavorable circumstances. That is why we see a special place for gold in our foreign exchange management process.*

Another less-talked-about reason for a country such as Poland to purchase gold is that it is in the EU but has not yet fully adopted the euro. Hence, such purchases could also be viewed as an attempt to raise reserve holdings to become more aligned with those of other EU members, in preparation for admittance to the currency club at some future date.

Exhibit 7 shows that the net increase in purchases by central banks over the last two years has been substantial.

Exhibit 7
Net Gold Demand from Central Banks
(tonnes)



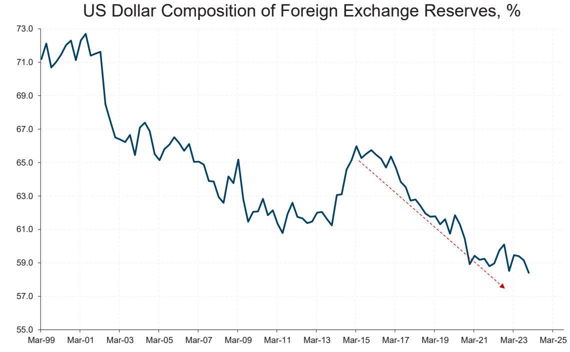
Sources: World Gold Council, William Blair Equity Research

China has been the main contributor of this increase. As exhibit 8 shows, Chinese bank reserves have continued to rise strongly in 2024, with the share of total reserve held in gold increasing from 3.7% at the end of 2022 to 4.6% at the end of February.

Exhibit 8
China's PBoC Foreign Exchange Reserve Holdings: Gold

At the government level, this is the result of China moving away from the Bretton Woods II arrangement of purchasing dollar assets to deeply undervalue its exchange rate and increase its export prowess. There is undoubtedly also an additional desire to limit and destabilize America's hegemonic grip on power via its control of the world's reserve currency. Certainly, the West's seizure of Russia's sovereign foreign-held exchange reserves will have only helped to accentuate the desire to move away from dollar reserves held abroad (exhibit 9).

Exhibit 9
US Dollar Composition of Foreign Exchange Reserves, %



At the household level, Chinese consumers have also been stronger buyers of gold (and silver). This has likely been the result of concerns about weaker economic growth and perhaps also as a way of increasing their own personal security following the severity of the restrictions put in place during the pandemic.

The fact that most of these purchases are happening outside the U.S. where inflation is much less of a problem (China is in deflation, and European inflation is slowing, with many parts in recession or stagnating) highlights that the rise in gold is seemingly for reasons other than inflation protection, as opposed to U.S. domestic investors buying gold based on fears of an inflationary surge.

Does the Copper/Gold Ratio Confirm This?

Another way to confirm (or dispel) this conclusion is to look at the behavior of the copper-to-gold ratio in relation to the 10-year T-Note yield.

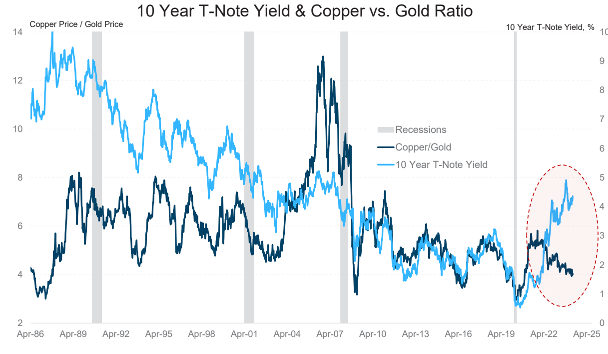
Copper is an industrial metal used in the production of everything from electronics to plumbing to automobiles and this makes it highly sensitive to global economic growth (hence the Dr. Copper moniker used as an indicator of the health of global demand).

Given its scarcity, gold tends to be viewed as less useful for industrial purposes and more as a precious metal for jewelry and as a store of value to hedge against inflation. Combining the two gives us a good indicator of growth relative to fear and economic weakness, and the fact that both are priced in dollars also helps to neutralize any dollar-related impact.

In the past, or again since around 2000, the copper-to-gold ratio has had a strong positive correlation with U.S. bond yields. A rising ratio would be indicative of stronger economic growth and rising inflationary pressures, while a falling ratio would be more indicative of weaker growth and the desire for the safe haven of gold and Treasurys.

Exhibit 10 is intriguing, therefore, as it once again shows a break with a historical pattern that has been in play for the last two decades.

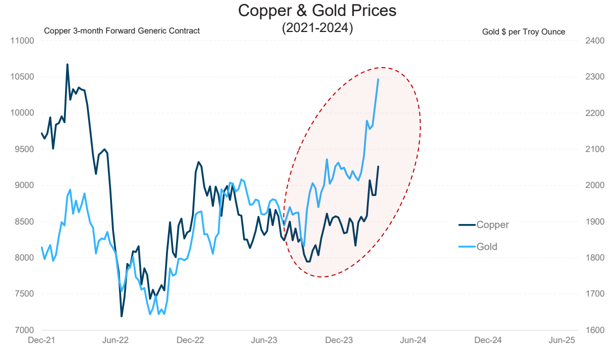
Exhibit 10
10 Year T-Note Yield & Copper vs. Gold Ratio



We can think of at least three possible reasons for the divergence.

First, the weakness in the ratio could be consistent with very weak global economic growth and inflation falling. This holds some merit given that China has overwhelmingly been the largest consumer of copper, and at the moment growth there is particularly poor. China is also carrying massive excess inventory of copper-heavy products, such as solar panels and electric vehicles. As mentioned, growth in Europe is also struggling. However, the problem with this view, as exhibit 11 indicates, is that the dip in the ratio is not the result of copper prices collapsing; rather, gold prices are soaring, and copper prices have risen a little too.

Exhibit 11
Copper & Gold Prices
(2021-2024)



Sources: Bloomberg, William Blair Equity Research

A second scenario that could be driving this divergence between the copper-to-gold ratio and Treasury yields is that investors could be starting to worry about possible stagflation, which would return us to the 1970s when the bond-gold relationship was also negative. Once again, this scenario does not quite stack up in the face of rising gold and copper prices.

Hence, we once again seem to be stuck with the conclusion that the rise in gold is less of an inflation story and more of a narrative about geopolitical issues, reserve/dollar diversification, and Chinese domestic consumer concerns about the degree of state control in China. Similarly, while the rise in real yields suggest that U.S. exceptionalism is playing a role in the rise in bond yields, what is also likely to be playing a role is the absence of the stabilizing force of large price-insensitive foreign buyers of U.S. Treasurys as they are increasing turning to gold.

Conclusion

The sharp rise in gold prices, coupled with the sharp backup in bond yields over the last few weeks, has been capturing investors' attention. One of the more obvious conclusions on the surface would be that U.S. growth is reaccelerating with no soft landing or hard landing. As a result, investors are becoming increasingly worried about what implications that might have for inflation and a possible return to a 1970s-1980s–style period of high inflation or stagflation.

Indeed, this could be a sensible conclusion when thinking about just the U.S. in a closed market. However, taking a wider global view of the situation and looking a little deeper below the surface reveals that there's more to this than meets the eye.

For one thing, the rise in bond yields seems to be more of a reflection of a rising real yield and a rising term premium, on the back of stronger domestic growth, the market's belief that future short rates may no longer need to be cut as much as previously anticipated, increased debt issuance, and, importantly, a shift in buyers away from price-insensitive foreign central banks toward more price-sensitive U.S. households. Meanwhile, those foreign buyers are increasingly turning to gold as a store of value and safe haven against geopolitical tremors.

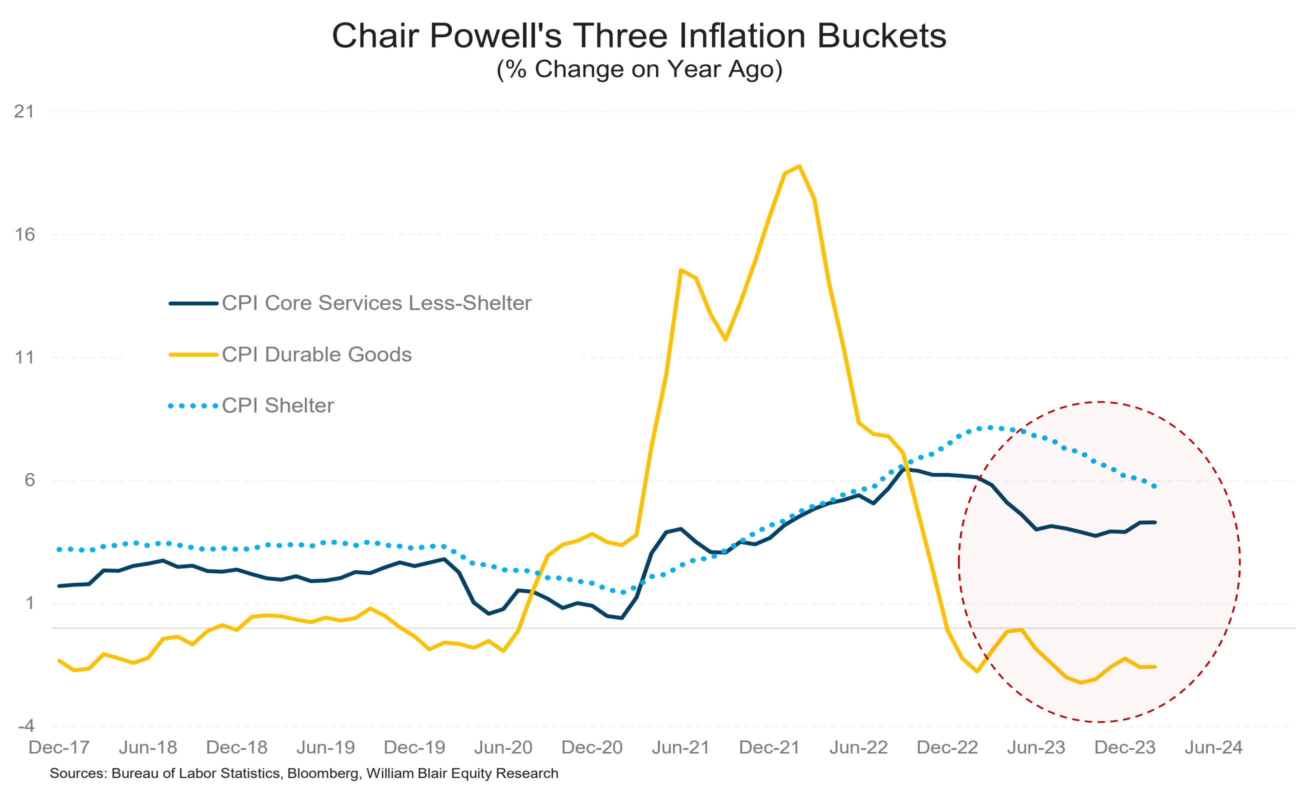
5 April 2024

Highlights in the Week Ahead

Date	Time (ET)	Indicator	Last	Consensus	WB Estimate	Actual
10 Apr	8:30 a.m.	Consumer Price Index (Mar)	0.4%	0.4%	0.4%	
		CPI Less-Food & Energy	0.4%	0.3%	0.3%	
11 Apr	8:30 a.m.	Producer Prices Index (Mar)	0.6%	0.3%	0.3%	
		PPI Less-Food & Energy	0.3%	0.2%	0.2%	

Sources: Bloomberg, William Blair Equity Research

Indicator of the Week: Consumer Price Index



Economic Scorecard

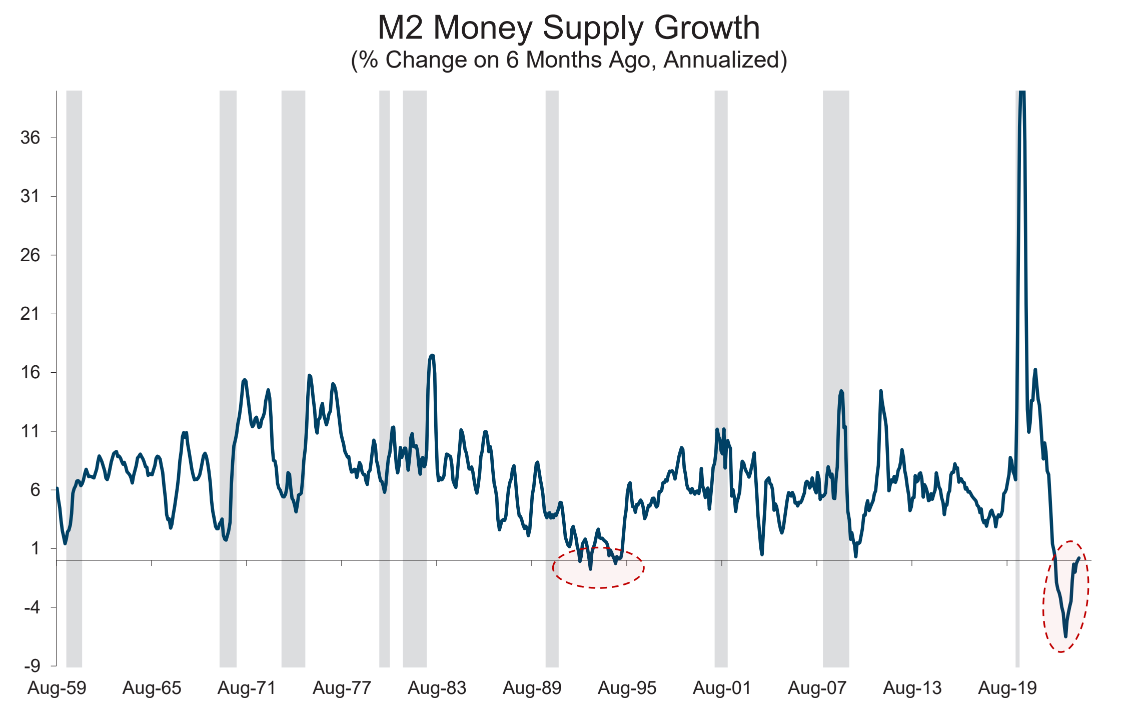
Rolling monthly heat map, % Change on Year Ago (unless otherwise noted)

	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	Feb-24	Mar-24	Apr-24
Growth																			
US Leading Indicators	-3.6	-5.1	-6.4	-6.1	-7.0	-8.0	-8.3	-8.2	-8.1	-7.8	-7.9	-8.1	-8.1	-7.6	-7.1	-7.0	-6.3		
US Coincident Indicators	1.4	0.8	0.8	1.5	1.4	1.4	1.4	1.7	1.8	1.7	1.4	1.3	1.4	1.9	2.2	1.8	1.9		
US Lagging Indicators	7.3	7.4	7.4	6.3	6.1	5.5	4.9	3.7	2.9	2.3	1.8	1.0	1.3	1.3	0.3	0.6	0.8		
Consumer																			
Total Retail Sales	8.9	6.2	5.5	8	5.6	2.2	1.3	2.1	1.5	2.8	2.8	4	2.2	3.6	5	0.0	1.5		
Personal Income	4.9	4.6	4.5	5.8	5.7	5.8	5.7	5.6	5.4	4.9	4.9	4.8	4.4	4.7	4.9	4.9	4.6		
Real Disposable Personal Income	-2	-1.6	-0.9	3.2	3.5	4.4	4.5	5	5.3	4.4	4.1	3.9	3.8	4.2	4.2	2.1	1.7		
Real Personal Consumption	1.4	0.9	1.3	2.3	2.3	1.7	1.6	1.8	2.1	2.5	2	2.1	2.1	2.9	3.3	2	2.4		
Personal Saving Rate (%)	3	3.3	3.4	4.4	4.7	5.2	5.2	5.3	4.8	4.4	4.5	3.9	4	4	3.9	4.1	3.6		
Consumer Confidence (Conference Board)**	102.2	101.4	109	106	103.4	104	103.7	102.5	110.1	114	108.7	104.3	99.1	101	108	110.9	104.8		
Employment																			
Employment Growth	3.6	3.3	3.0	3.2	2.8	2.5	2.5	2.5	2.4	2.1	2.1	2.0	1.9	1.9	2.0	1.8	1.8		
ASA Temporary Staffing Index	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	-12.2	-9.4		
ISM Employment Index Manufacturing*	50.2	49.3	50.2	50	48.8	47.8	49.4	50.3	49.1	45	48.6	50.9	47.1	46.1	47.5	47.1	45.9	47.4	
ISM Employment Index Services*	49.5	50.4	49.8	50.4	53.6	51.1	51.2	49.7	52.9	50.9	54.1	52.5	50.4	50.6	43.8	50.5	48	48.5	
Unemployment Rate, %	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	3.7	3.9		
Average Hourly Earnings	5	5.1	4.9	4.6	4.7	4.6	4.7	4.6	4.7	4.7	4.5	4.5	4.3	4.3	4.3	4.4	4.3		
Initial Jobless Claims (avg. wkly. chg. '000s)	203	210	208	203	214	224	217	227	252	234	245	217	211	218	206	210	209	214	
Jop Openings	-7.4	-4.3	-4.4	-7.3	-15.8	-21.0	-15.9	-18.8	-18.6	-23.7	-7.5	-13.7	-17.5	-16.5	-19.2	-16.1	-11.1		
Layoff Announcements	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	-20.2	-20	8.8		
Housing Market																			
Housing Starts	-8.9	-16.6	-24.1	-19.7	-18.9	-19.4	-25.2	2.6	-9.2	5.8	-13.3	-7.3	-3.9	6	15.4	2.5	5.9		
New Home Sales	-15.1	-24.6	-23.4	-19.9	-19.1	-9.5	11.1	11.6	21.3	34.1	2.5	23.1	16.1	4.6	2.7	2.3	5.9		
Existing Home Sales	-27.7	-34.8	-33.7	-36.7	-23.1	-22.7	-23.7	-20.9	-19.4	-16.7	-15.2	-15.3	-14.3	-6.7	-5.8	-1.7	-3.3		
Median House Price (Existing Homes)	16.3	7.4	17	0.4	1.4	0.7	-8.9	-6.5	-3.5	-8.9	0.1	-10.8	-16	-7.1	-12.5	-4	-7.6		
Existing Homes Inventory (Mths' supply)	3.2	3.4	3.3	3.3	2.9	2.9	2.9	2.9	2.9	3	3	3.2	3.4	3.5	3.6	3.5	3		
New Homes Inventory (Mths' supply)	9.7	9.4	8.5	8.1	8.4	8.1	7.6	7.2	7.5	7.1	7.9	7.5	7.9	8.8	8.3	8.3	8.4		
NAHB Homebuilder Sentiment*	38	33	31	35	42	44	45	50	55	56	50	44	40	34	37	44	48	51	
Inflation																			
Consumer Price Index	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	3.1	3.2		
CPI Less-food & energy	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	3.9	3.8		
Producer Price Index	8.2	7.4	6.4	5.7	4.7	2.7	2.3	1.1	0.3	1.1	1.9	1.8	1.1	0.8	1.1	1	1.6		
PPI Less-food & energy	6.9	6.3	5.7	5	4.6	3.3	3.1	2.8	2.5	2.7	2.5	2.3	2.2	1.9	1.8	2	2		
PCE Price Index	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	2.7	2.6	2.4	2.5		
PCE Prices Less-food & energy	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	2.9	2.9	2.8		
Business Activity - US																			
Industrial Production	3.1	1.9	0.6	1.5	0.9	0.2	0.4	0.1	-0.4	0.1	-0.1	-0.2	-0.8	-0.1	1.2	-0.3	-0.2		
New Cap Gds Orders less-aircraft & parts	5	3.2	1	5.6	2.7	1.9	1	3.2	1.4	0.4	0.6	0.5	0.8	1.4	0.8	-0.2	3		
Business Inventories	18.3	16.9	15.2	12.5	10.7	8.8	6.2	5.2	3.3	1.8	1.4	1	1	0.7	0.3	0.4	0.4		
ISM Manufacturing PMI*	50	48.9	48.1	47.4	47.7	46.5	47	46.6	46.4	46.5	47.6	48.6	46.9	46.6	47.1	49.1	47.8	50.3	
Markit US Manufacturing PMI*	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	50.7	52.2	51.9	
ISM Services Index*	54.7	55.2	49	54.7	55	51.2	52.3	51	53.6	52.8	54.1	53.4	51.9	52.5	50.5	53.4	52.6	51.4	
Markit US Services PMI*	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	52.5	52.3	51.7	
Business Activity - International																			
Germany Manufacturing PMI Markit/BME*	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	45.5	42.5	41.9	
Japan Manufacturing PMI Jibun Bank*	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	48	47.2	48.2	
Caixin China Manufacturing PMI*	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	50.8	50.9	51.1	
China Manufacturing PMI*	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	49.2	49.1	50.8	
UK Manufacturing PMI Markit/CIPS*	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	47	47.5	50.3	
France Manufacturing PMI Markit*	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	43.1	47.1	46.2	
Currencies*																			
Euro (EUR/USD)	-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	-0.4	2.2	-0.5	
Renmimbi (USD/CNY)	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	6.1	3.6	5.1	
Yen (USD/Yen)	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	12.9	10.1	13.9	
Sterling (GBP/USD)	-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	3.0	5.0	2.3	
Canadian $ (USD/CAD)	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	1.0	-0.5	0.2	
Mexican Peso (USD/MXN)	-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	-8.6	-6.8	-8.2	
US Equities																			
S&P 500	-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	18.9	28.4	27.9	
S&P 400 Midcap	-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	3.0	11.1	21.3	
S&P 600 Smallcap	-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	-0.1	4.5	13.8	
Russell 2000	-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	0.8	8.3	17.9	

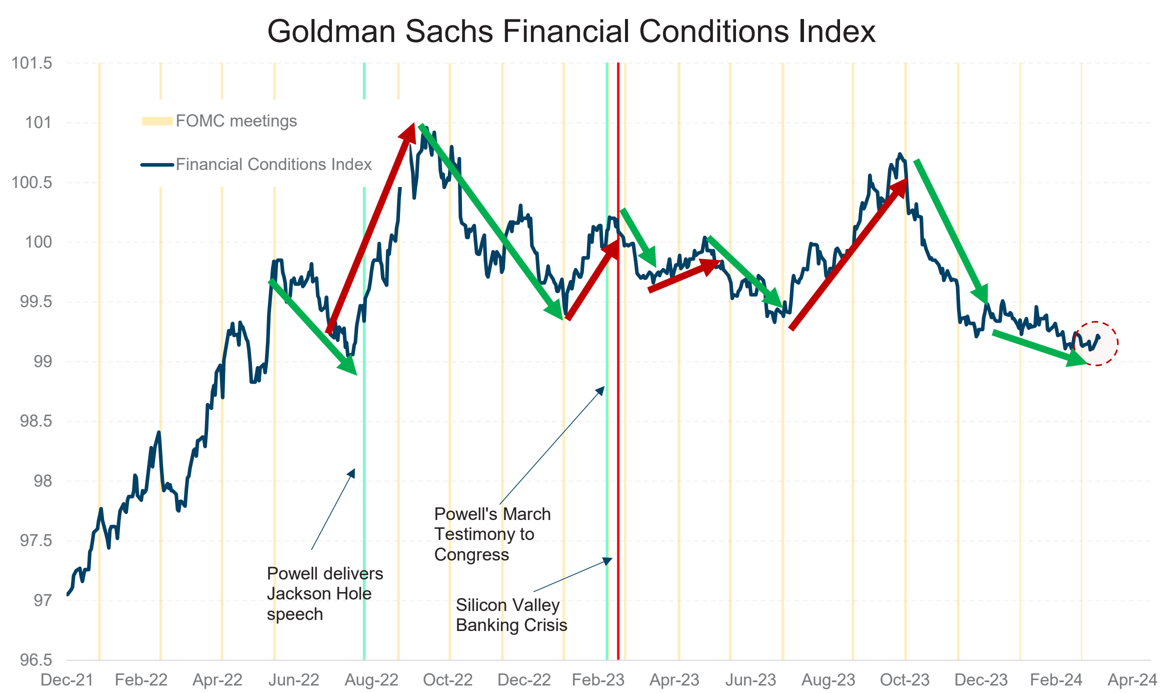
* Diffusion Index, **1985=100, ***Currencies - green/red = strengthening/weakening foreign currency vs dollar

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

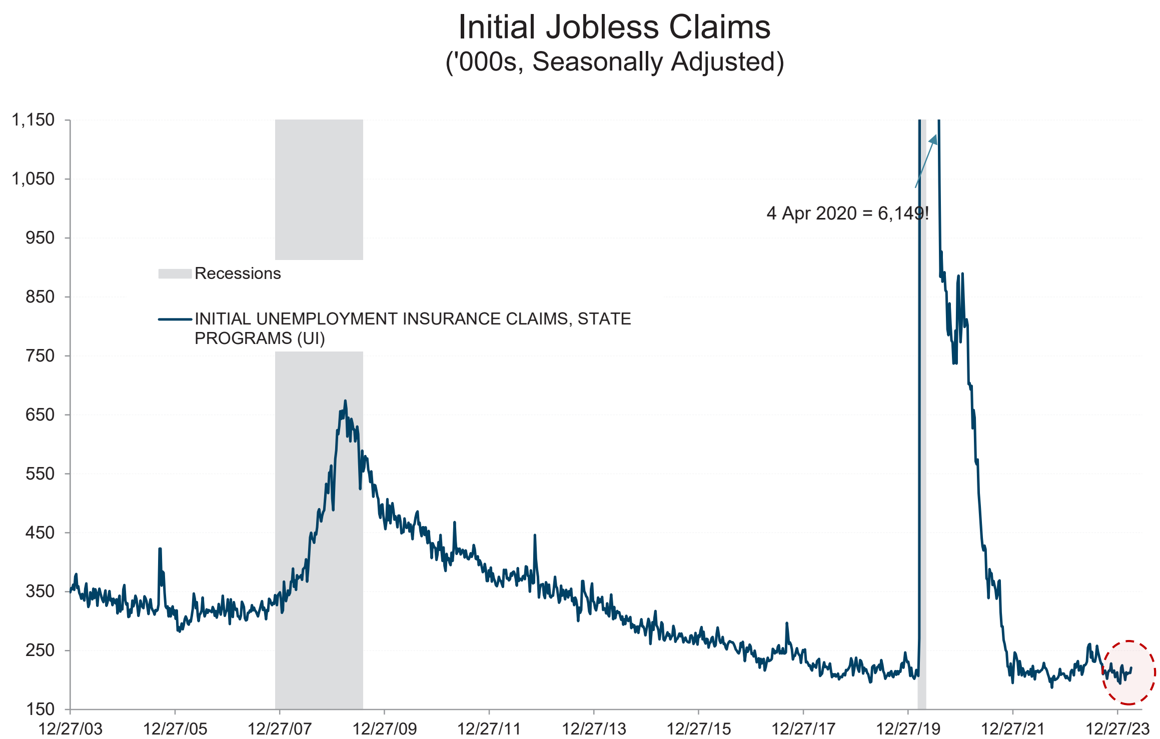
Other Economic Indicators



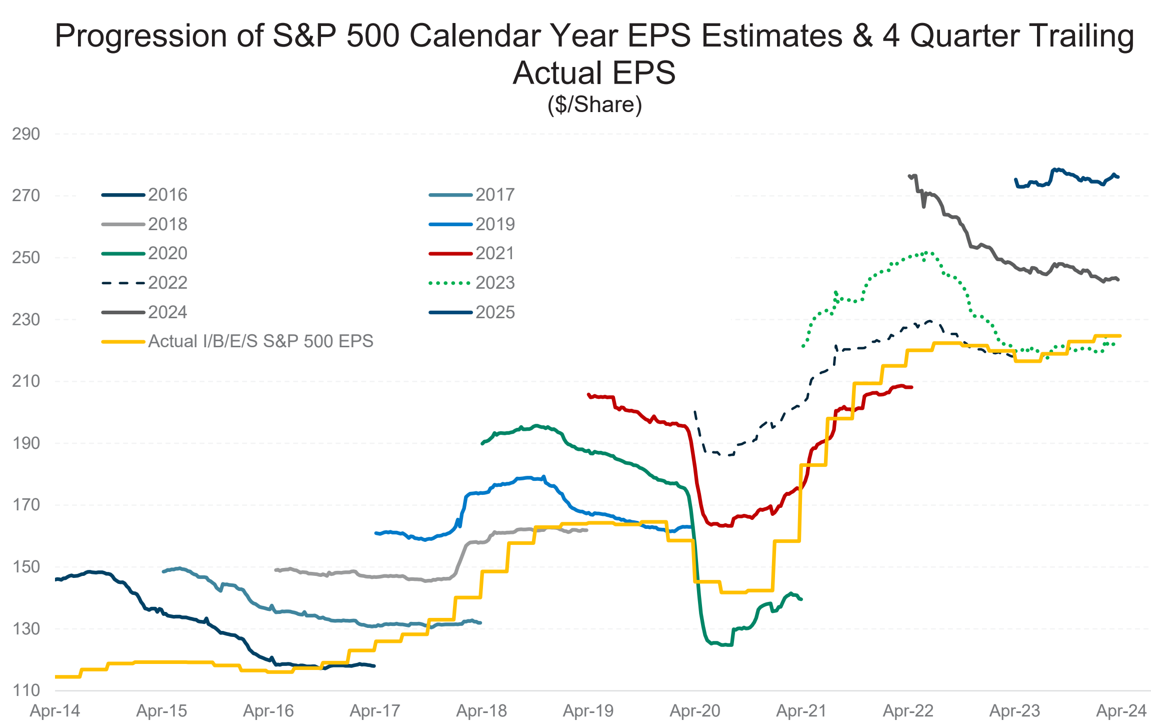
Sources: Federal Reserve, William Blair Equity Research



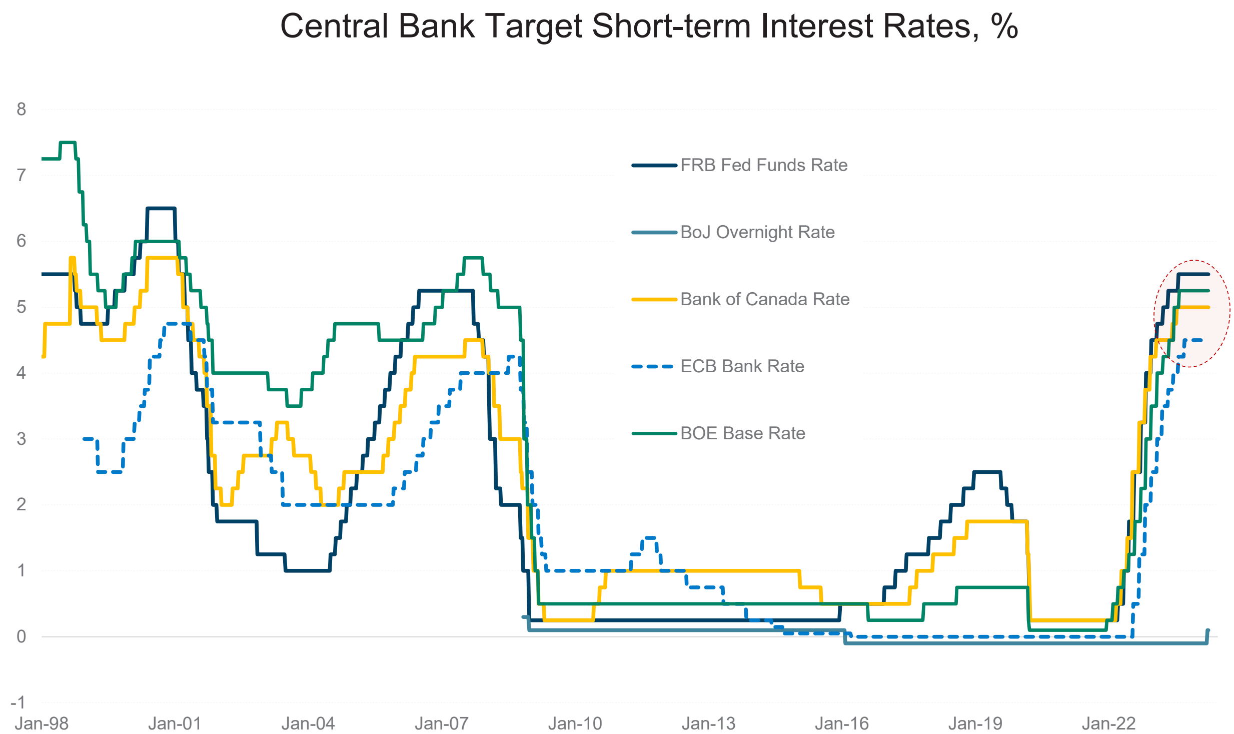
Sources: Bloomberg, William Blair Equity Research



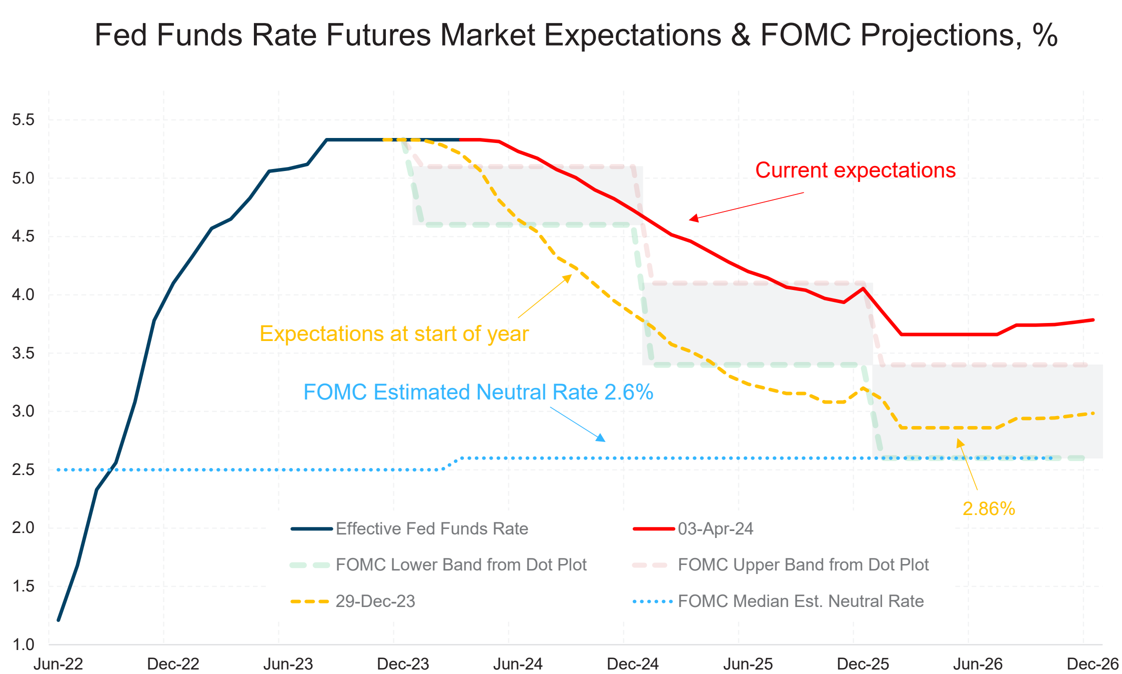
Source: Department of Labor, Bloomberg, William Blair Equity Research



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* 04-Apr-24	Week Ago 28-Mar-24	Month Ago 04-Mar-24	Qtr-to-Date 28-Mar-24	Year-to-Date 29-Dec-23
S&P 500 Index	**100.00**	**-2.04**	**0.32**	**-2.04**	**7.91**
S&P400 MidCap Index		**-2.68**	**1.16**	**-2.68**	**6.58**
S&P600 SmallCap Index		**-3.08**	**-0.04**	**-3.08**	**-1.14**
Dow Jones Industrials		**-3.04**	**-1.01**	**-3.04**	**2.41**
Nasdaq Composite		**-2.02**	**-0.98**	**-2.02**	**6.91**
Communication Services	**9.43**	**0.84**	**6.28**	**0.84**	**16.54**
Advertising	0.07	-3.13	2.57	-3.13	3.49
Broadcasting	0.05	1.37	11.28	1.37	-3.86
Cable & Satellite	0.45	-5.38	-1.91	-5.38	-10.60
Integrated Telecommunication Services	0.68	0.61	5.01	0.61	9.21
Interactive Home Entertainment	0.13	-1.04	-3.05	-1.04	-6.04
Interactive Media & Services	6.42	1.88	8.47	1.88	20.08
Movies & Entertainment	1.17	-1.25	1.59	-1.25	24.18
Publishing & Printing	0.03	-2.43	-1.70	-2.43	3.71
Wireless Telecommunication Svcs	0.43	-0.99	-1.06	-0.99	0.80
Consumer Discretionary	**10.63**	**-2.80**	**-1.91**	**-2.80**	**1.82**
Apparel Retail	0.35	-5.36	-3.67	-5.36	1.73
Apparel & Accessories & Luxury Goods	0.13	-8.91	-16.97	-8.91	-21.40
Auto Parts & Equipment	0.06	-4.28	-0.24	-4.28	-13.09
Automobile Manufacturers	1.44	-2.58	-6.66	-2.58	-25.45
Automobile Retail	0.29	-2.89	1.18	-2.89	16.04
Broadline Retail	4.24	-0.27	1.40	-0.27	18.20
Casinos & Gaming	0.17	0.05	5.18	0.05	4.12
Computer & Electronics Retail	0.04	-3.69	1.88	-3.69	0.92
Consumer Electronics	0.06	-2.67	3.74	-2.67	12.72
Distributors	0.11	-3.46	-1.36	-3.46	4.63
Footwear	0.29	-5.49	-9.37	-5.49	-16.91
Home Furnishings	0.02	-6.70	1.06	-6.70	17.99
Home Improvement Retail	1.09	-6.70	-4.82	-6.70	4.22
Homebuilding	0.31	-4.89	2.18	-4.89	7.60
Hotels, Resorts & Cruise Lines	0.87	-3.17	1.29	-3.17	4.43
Household Appliances	0.01	-4.18	7.58	-4.18	-5.86
Leisure Products	0.02	-1.19	10.88	-1.19	9.38
Restaurants	1.00	-3.55	-3.91	-3.55	-2.13
Other Specialty Retail	0.13	-8.77	-7.71	-8.77	4.38
Consumer Staples	**6.43**	**-2.88**	**0.12**	**-2.88**	**3.73**
Agricultural Products	0.11	1.36	18.28	1.36	-7.77
Brewers	0.03	0.19	8.08	0.19	10.08
Hypermarkets	2.08	-2.41	-1.98	-2.41	10.24
Distillers & Vintners	0.14	-2.33	1.99	-2.33	5.27
Drug Retail	0.04	-12.49	-7.77	-12.49	-27.31
Food Distributors	0.08	-5.70	-3.72	-5.70	4.68
Food Retail	0.09	0.54	16.34	0.54	25.66
Household Products	1.17	-3.77	-1.59	-3.77	6.36
Packaged Foods & Meats	0.74	-1.76	2.01	-1.76	0.13
Personal Products	0.16	-6.19	1.91	-6.19	-3.93
Soft Drinks	1.31	-3.12	0.66	-3.12	-0.52
Tobacco	0.47	-2.76	1.36	-2.76	-1.87
Energy	**4.08**	**2.79**	**13.42**	**2.79**	**15.83**
Integrated Oil & Gas	1.86	2.66	12.08	2.66	14.90
Oil & Gas Equipment & Services	0.40	0.51	12.41	0.51	4.92
Oil & Gas Exploration & Production	1.07	3.22	14.62	3.22	13.70
Oil & Gas Refining & Marketing & Transportation	0.47	5.91	22.37	5.91	37.39
Oil & Gas Storage & Transportation	0.36	0.21	6.56	0.21	13.24

Financials	**12.66**	**-2.30**	**2.25**	**-2.30**	**9.39**
Asset Management & Custody Banks	0.85	-3.58	-0.68	-3.58	0.78
Consumer Finance	0.58	-4.01	1.88	-4.01	13.47
Diversified Banks	3.00	-2.69	4.17	-2.69	12.14
Financial Exchanges & Data	1.08	-0.97	-0.84	-0.97	-0.85
Insurance Brokers	0.59	-3.77	-0.72	-3.77	7.96
Investment Banking & Brokerage	0.97	-2.01	3.88	-2.01	3.34
Life & Health Insurance	0.39	-1.76	4.65	-1.76	6.69
Multi-line Insurance	0.14	-2.40	4.10	-2.40	12.05
Multi-Sector Holdings	1.21	-1.24	2.96	-1.24	16.44
Property & Casualty Insurance	0.99	-1.00	6.11	-1.00	21.25
Regional Banks	0.28	-3.89	3.58	-3.89	2.63
Reinsurance	0.04	-4.54	3.25	-4.54	7.32
Transaction & Payment Processing	2.53	-2.43	0.06	-2.43	8.18
Health Care	**12.15**	**-3.94**	**-2.62**	**-3.94**	**4.12**
Biotechnology	1.82	-5.63	-4.22	-5.63	-0.60
Health Care Distributors	0.34	-0.81	-0.01	-0.81	13.48
Health Care Equipment	2.37	-3.39	-2.55	-3.39	6.25
Health Care Facilities	0.21	-2.94	2.83	-2.94	19.09
Health Care Services	0.53	-3.75	3.17	-3.75	4.72
Health Care Supplies	0.11	-3.31	-1.09	-3.31	6.58
Life Sciences Tools & Services	1.38	-3.15	-3.19	-3.15	4.28
Managed Health Care	1.41	-7.42	-5.12	-7.42	-10.90
Pharmaceuticals	3.96	-2.71	-1.98	-2.71	10.78
Industrials	**8.80**	**-1.65**	**1.84**	**-1.65**	**8.75**
Aerospace & Defense	1.89	0.33	3.35	0.33	2.48
Agricultural & Farm Machinery	0.25	-0.88	11.71	-0.88	1.81
Air Freight & Logistics	0.45	-1.79	3.01	-1.79	-1.68
Building Products	0.50	-2.30	1.80	-2.30	11.39
Construction & Engineering	0.08	-0.58	6.14	-0.58	19.69
Construction Machinery & Heavy Trucks	0.70	0.08	8.28	0.08	23.69
Data Processing & Outsourced Services	0.05	-3.06	-3.39	-3.06	-3.48
Diversified Support Svcs	0.27	-3.50	4.40	-3.50	11.83
Electrical Components & Equipment	0.66	0.14	4.27	0.14	17.80
Environmental & Facilities Services	0.41	-2.73	0.08	-2.73	12.31
Human Resource & Employment Services	0.38	-2.98	-1.65	-2.98	0.96
Industrial Conglomerates	0.76	-3.67	3.84	-3.67	9.86
Industrial Machinery	0.86	-1.90	1.83	-1.90	9.81
Passenger Airlines	0.15	-6.13	-2.58	-6.13	5.77
Railroads	0.62	-2.32	-5.08	-2.32	0.96
Research & Consulting Svcs	0.22	-3.97	-3.75	-3.97	4.20
Trading Companies & Distributors	0.31	-2.93	-0.59	-2.93	18.99
Information Technology	**29.30**	**-2.35**	**-2.40**	**-2.35**	**9.83**
Application Software	2.36	-3.03	-7.41	-3.03	-0.35
Communications Equipment	0.82	-2.48	-0.69	-2.48	3.69
Electronic Components	0.22	-0.64	1.22	-0.64	13.34
Electronic Equipment & Instruments	0.17	-2.53	-1.55	-2.53	1.20
Electronic Manufacturing Services	0.14	0.02	-1.87	0.02	3.88
Internet Software & Services	0.08	-1.92	-3.48	-1.92	-9.81
IT Consulting & Services	1.07	-3.17	-8.74	-3.17	1.46
Semiconductor Equipment	0.93	-2.24	-3.46	-2.24	19.08
Semiconductors	8.88	-4.02	-2.29	-4.02	35.66
Systems Software	8.37	-0.83	0.63	-0.83	10.72
Technology Distributors	0.08	-1.26	2.38	-1.26	11.10
Technology Hardware, Storage & Peripherals	6.19	-1.55	-3.51	-1.55	-11.65
Materials	**2.35**	**-1.05**	**3.97**	**-1.05**	**7.30**
Commodity Chemicals	0.17	2.83	4.07	2.83	9.41
Construction Materials	0.16	-2.08	-0.17	-2.08	19.13
Copper	0.16	4.59	28.34	4.59	15.53
Fertilizers & Agricultural Chemicals	0.16	-0.53	5.80	-0.53	9.04
Gold	0.10	5.25	12.68	5.25	-8.86
Industrial Gases	0.61	-1.64	0.19	-1.64	5.55

Metal & Glass Containers	0.05	-2.03	2.28	-2.03	14.73
Paper Packaging	0.16	-1.65	3.44	-1.65	8.40
Specialty Chemicals	0.62	-3.66	1.34	-3.66	3.13
Steel	0.16	0.09	8.27	0.09	17.31
Real Estate	**2.20**	**-3.57**	**-4.55**	**-3.57**	**-4.88**
Data Center REITs	0.26	-4.47	-12.57	-4.47	-0.58
Health Care REITs	0.18	-2.80	-1.44	-2.80	-4.08
Hotel & Resort REITs	0.03	-2.90	-4.70	-2.90	3.13
Industrial REITs	0.26	-4.25	-6.68	-4.25	-6.46
Multi-Family Residential REITs	0.00	-3.08	-2.40	-3.08	-3.52
Office REITs	0.07	-5.28	-4.04	-5.28	-6.44
Real Estate Service	0.15	-3.63	3.57	-3.63	3.91
Retail REITs	0.28	-4.05	-2.42	-4.05	-4.40
Self-Storage REITs	0.18	-2.62	-1.75	-2.62	-8.76
Single-Family Residential REITs	0.18	-2.62	-1.75	-2.62	-8.76
Telecom Tower REITs	0.35	-3.52	-7.26	-3.52	-12.51
Timber REITs	0.06	-3.54	-2.03	-3.54	-0.38
Utilities	**2.14**	**-1.09**	**4.19**	**-1.09**	**2.47**
Electric Utilities	1.44	-0.98	5.40	-0.98	4.15
Gas Utilities	0.04	-2.30	1.26	-2.30	0.20
Independent Power Producers & Energy Traders	0.03	1.17	12.89	1.17	-5.76
Water Utilities	0.05	-1.50	-1.08	-1.50	-8.80
Multi-Utilities	0.59	-1.33	1.65	-1.33	0.18

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

IMPORTANT DISCLOSURES

This report is available in electronic form to registered users via R*Docs™ at https://williamblairlibrary.bluematrix.com or www.williamblair.com.

Please contact us at +1 800 621 0687 or consult https://www.williamblair.com/equity-research/coverage for all disclosures.

Richard de Chazal attests that 1) all of the views expressed in this research report accurately reflect his/her personal views about any and all of the securities and companies covered by this report, and 2) no part of his/her compensation was, is, or will be related, directly or indirectly, to the specific recommendations or views expressed by him/her in this report. We seek to update our research as appropriate. Other than certain periodical industry reports, the majority of reports are published at irregular intervals as deemed appropriate by the research analyst.

DOW JONES: 38597.00
S&P 500: 5147.21
NASDAQ: 16049.10

Additional information is available upon request.

Current Rating Distribution (as of April 4, 2024):

Coverage Universe	Percent	Inv. Banking Relationships *	Percent
Outperform (Buy)	71	Outperform (Buy)	7
Market Perform (Hold)	28	Market Perform (Hold)	2
Underperform (Sell)	1	Underperform (Sell)	0

*Percentage of companies in each rating category that are investment banking clients, defined as companies for which William Blair has received compensation for investment banking services within the past 12 months.

The compensation of the research analyst is based on a variety of factors, including performance of his or her stock recommendations; contributions to all of the firm's departments, including asset management, corporate finance, institutional sales, and retail brokerage; firm profitability; and competitive factors.

OTHER IMPORTANT DISCLOSURES

Stock ratings and valuation methodologies: William Blair & Company, L.L.C. uses a three-point system to rate stocks. Individual ratings reflect the expected performance of the stock relative to the broader market (generally the S&P 500, unless otherwise indicated) over the next 12 months. The assessment of expected performance is a function of near-, intermediate-, and long-term company fundamentals, industry outlook, confidence in earnings estimates, valuation (and our valuation methodology), and other factors. Outperform (O) - stock expected to outperform the broader market over the next 12 months; Market Perform (M) - stock expected to perform approximately in line with the broader market over the next 12 months; Underperform (U) - stock expected to underperform the broader market over the next 12 months; not rated (NR) - the stock is not currently rated. The valuation methodologies include (but are not limited to) price-to-earnings multiple (P/E), relative P/E (compared with the relevant market), P/E-to-growth-rate (PEG) ratio, market capitalization/revenue multiple, enterprise value/EBITDA ratio, discounted cash flow, and others. Stock ratings and valuation methodologies should not be used or relied upon as investment advice. Past performance is not necessarily a guide to future performance.

The ratings and valuation methodologies reflect the opinion of the individual analyst and are subject to change at any time.

Our salespeople, traders, and other professionals may provide oral or written market commentary, short-term trade ideas, or trading strategies-to our clients, prospective clients, and our trading desks-that are contrary to opinions expressed in this research report. Certain outstanding research reports may contain discussions or investment opinions relating to securities, financial instruments and/or issuers that are no longer current. Always refer to the most recent report on a company or issuer. Our asset management and trading desks may make investment decisions that are inconsistent with recommendations or views expressed in this report. We will from time to time have long or short positions in, act as principal in, and buy or sell the securities referred to in this report. Our research is disseminated primarily electronically, and in some instances in printed form. Research is simultaneously available to all clients. This research report is for our clients only. No part of this material may be copied or duplicated in any form by any means or redistributed without the prior written consent of William Blair & Company, L.L.C.

This is not in any sense an offer or solicitation for the purchase or sale of a security or financial instrument. The factual statements herein have been taken from sources we believe to be reliable, but such statements are made without any representation as to accuracy or completeness or otherwise, except with respect to any disclosures relative to William Blair or its research analysts. Opinions expressed are our own unless otherwise stated and are subject to change without notice. Prices shown are approximate.

If the recipient received this research report pursuant to terms of service for, or a contract with William Blair for, the provision of research services for a separate fee, and in connection with the delivery of such research services we may be deemed to be acting as an investment adviser, then such investment adviser status relates, if at all, only to the recipient with whom we have contracted directly and does not extend beyond the delivery of this report (unless otherwise agreed specifically in writing). If such recipient uses these research services in connection with the sale or purchase of a security referred to herein, William Blair may act as principal for our own account or as riskless principal or agent for another party. William Blair is and continues to act solely as a broker-dealer in connection with the execution of any transactions, including transactions in any securities referred to herein.

This material is distributed in the United Kingdom and the European Economic Area (EEA) by William Blair International, Ltd., authorised and regulated by the Financial Conduct Authority (FCA). William Blair International, Limited is a limited liability company registered in England and Wales with company number 03619027. This material is only directed and issued to persons regarded as Professional investors or equivalent in their home jurisdiction, or persons falling within articles 19 (5), 38, 47, and 49 of the Financial Services and Markets Act of 2000 (Financial Promotion) Order 2005 (all such persons being referred to as "relevant persons"). This document must not be acted on or relied on by persons who are not "relevant persons."

William Blair & Company, L.L.C. licenses and applies the SASB Materiality Map® and SICSTM in our work.