Macro Intelligence Report

December 2023

GAMMA INVESTMENT CONSULTING

Gamma Global Macro Model Highlights

- **The S&P 500 and Nasdaq Models remained NEUTRAL (in cash) for December**. Despite last month's 8.9% gain in the S&P 500 and improvement in several short-term indicators, the combination of high valuation and a negative reading from the Gamma Liquidity Indicator kept the Models on the sidelines.

- **The 30-year Treasury Bond Model remained LONG (lower yields) for December. The Investment Grade Corporate and High Yield Corporate Models also went LONG, though the 10-year Treasury Note Model remained NEUTRAL.** The gradual move to long fixed income positions reflects continued improvement in headline inflation, expectations that the long-awaited slowing in economic activity is underway, and that the Federal Reserve is likely done tightening and may begin to cut rates by next March.

- **The Gold Model went LONG for December joining the Silver and Platinum Models.** Gold continues to benefit from favorable valuation and expectations that interest rates may start to decline by early in 2024.

- **The EUR/USD Model remained SHORT euros (long USD) for December.** With Federal Reserve and European Central Bank policy on hold, the dollar continues to benefit from a 155 basis point edge on short term interest rates and a 190 basis point advantage on 10-year governments.

I. Equity Index Outlook

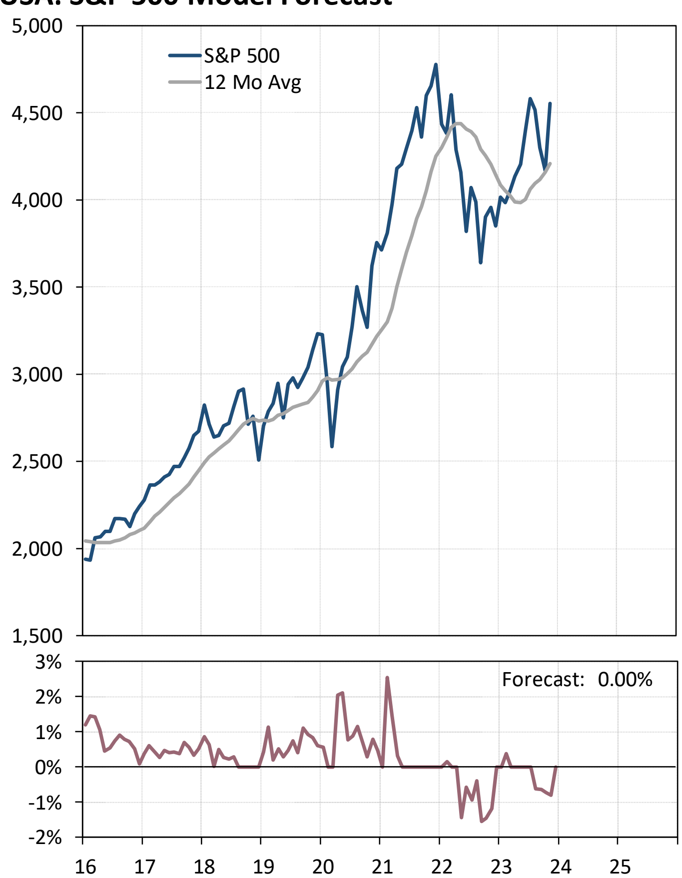
U.S. equities posted solid gains in November. The S&P 500 rose 8.9% during the month and was up 19.2% from its December 2022 low. Despite November's gain, however, the Index still finished the month -0.5% below the July high. The Nasdaq posted an even stronger 10.7% gain that left the Index up a whopping 34.7% from the end of 2022. Like the S&P 500, however, the Nasdaq still ended November -0.9% below its July peak. The stock market's resilience has been driven by recovering corporate earnings and slowing headline inflation that investors believe will allow the Federal Reserve to start cutting rates early in 2024.

Despite the improvement in several short-term indicators last month, the Gamma Models continue to indicate that investor confidence in a new bull market is premature (Chart 1).

- **<u>Liquidity is still negative</u>**. Liquidity has likely bottomed for this cycle but is not yet strong enough to support a sustained rally in stock prices. The Gamma Liquidity Indicator has recovered from its -2.0 standard deviation low hit in May (its most restrictive level since

Chart 1

USA: S&P 500 Model Forecast



1981, Chart 2). 12-month liquidity momentum has turned positive for the first time since late 2018. We have likely turned the corner on the worst of the liquidity contraction for this cycle. Equity bulls need to be aware that this improvement has not occurred due to an actual *expansion* in liquidity. It has occurred due to *slower deterioration* in liquidity. In other words, liquidity is still negative; it's just not worsening as fast as it was previously. **The Liquidity Indicator's current reading of -1.25 standard deviations is still the weakest since September 1981.** History shows that many of the worst bear markets (2000-2001, 2008) occurred well after liquidity growth turned positive.

- **Short-term interest rates are still at a two-decade high**. The Federal Reserve has kept rates steady for the past four months, but they are still at their highest level since February 2021 (Chart 3). Fed Chairman Jerome Powell went so far last week to say that it was "premature" to conclude that monetary policy was "sufficiently restrictive" or to speculate on when the central bank might start cutting rates. He even added that **the Fed is prepared to tighten further if needed**. Despite these comments (and the third-quarter's stunning 5.2% gain in real GDP), investors have aggressively moved forward their expectation of when the Fed will start to cut rates. Prior to Powell's comments, the odds of a Fed rate cut in January were effectively zero as Wall Street was targeting a cut in May or June at the earliest. After his speech, however, the odds jumped to 15% in January and 50% in March with a virtual certainty of lower rates by May.

Chart 2

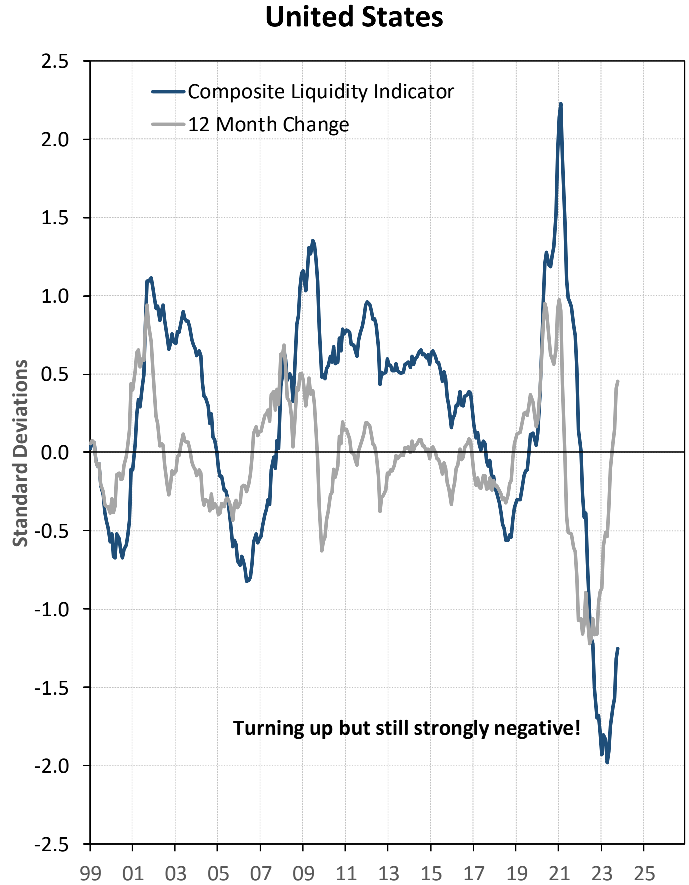
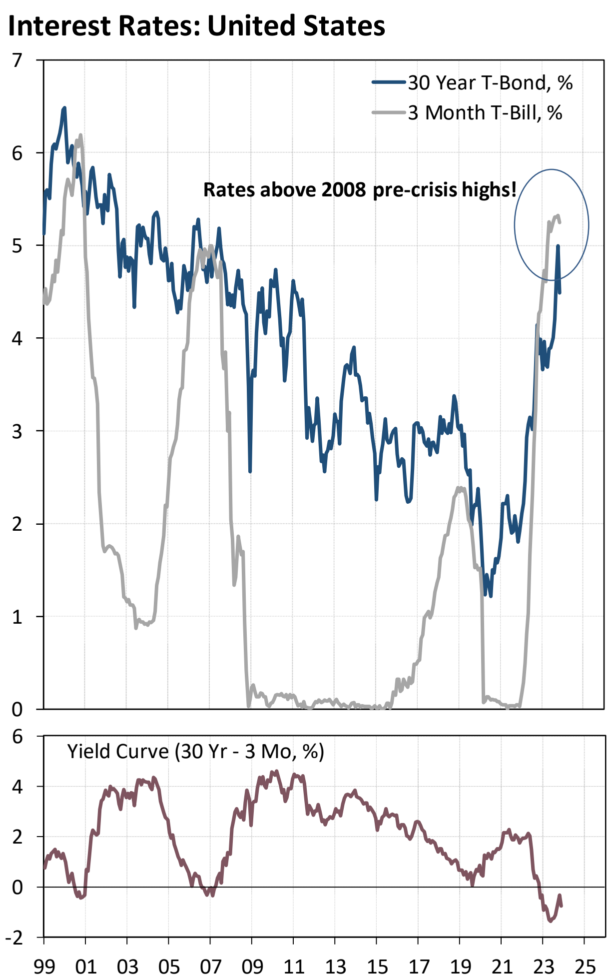


Chart 3



So, what's driving these expectations, and are they realistic? The obvious explanation is that the inflation rate continues to fall faster than expected. Inflation as measured by the Fed's preferred measure, the personal consumption expenditure deflator (PCED), slipped to a 3.0% yr/yr rate last month (Chart 4). Inflation had stabilized at 3.4% the previous three months raising concerns that it might begin to reaccelerate. Inflation has fallen from a 7.1% rate in June 2022. Even excluding the volatile food and energy component which has helped slow the pace of improvement, inflation improved to a 3.5% yr/yr rate from a peak of 5.5%. Services inflation improved to a 4.4% rate from a 6.0% rate in January. The services component has been of concern. The persistently low unemployment rate has raised concerns that higher employment costs would prevent any further improvement in the overall inflation because of their impact on services.

The outlook for interest rates will depend heavily on whether the inflation rate continues to converge to the Fed's 2% target rate. The improvement in the headline number up to this point has been largely due to lower food, energy, and nondurable goods prices. Commodity price inflation, dominated by food and energy, peaked at a 93% yr/yr rate in late 2021 and has since fallen to a -11% rate (Chart 5). Nondurable goods inflation has fallen from a 13.1% rate to a 1.6% rate in November.

The core inflation rate at 3.5% is still well above that 2% level and may require a substantially weaker economy to get it much lower. Further improvement will likely depend on whether the long-anticipated slowing in the economy actually occurs. Economists have been expecting slower growth all year, yet economic growth has actually accelerated. Third quarter GDP jumped at a 5.2% annual rate following gains of 2.2% and 2.1% in the first and second quarters, respectively. This occurred despite the Index of Leading Indicators (LEI) falling for 19 consecutive months. The 19-month decline is the third worst stretch since 1950. The two worst stretches (1974-1975 and 2008-2009) ended with the two worst recessions since the 1930's. The LEI's pace of decline has accelerated in the past three months with the yr/yr change dropping to -7.8% in November. The massive increase in liquidity in 2020-2021 likely delayed a downturn in growth. If history is any guide, however, slower growth is coming.

If economic growth stays above 2%, the Federal Reserve is likely to keep rates steady for longer until inflation has clearly fallen to the target 2% rate which, given the current 3.5% core rate, would be unlikely before mid-2024. On the other hand, if the economy slows substantially (as the LEI indicates), the Fed may move more aggressively to cut rates. Whether this ends up being positive for equities depends on which dominates: lower interest rates or weaker earnings due to slowing growth.

Chart 4

Inflation Measures

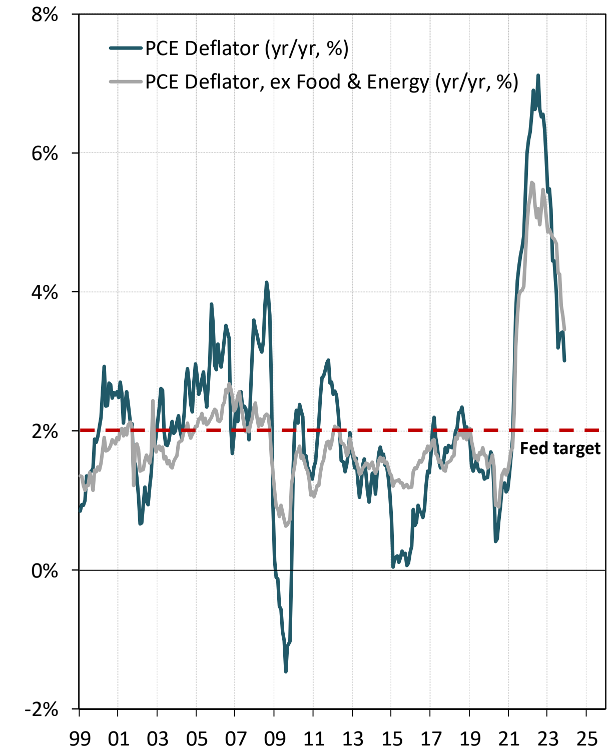
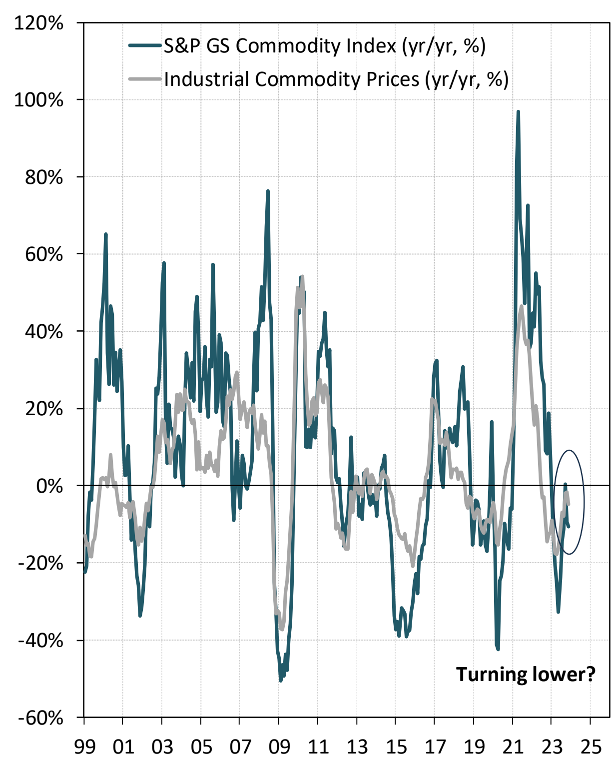


Chart 5

Commodity Price Inflation



- **Money growth remains negative**. All three major measures of real (inflation-adjusted) money growth remain strongly negative on an yr/yr basis (Chart 6). As of the end of November, yr/yr growth in real M1 was down -13.7%. Real True money Supply (TMS) and real M2 were both down -7.0%. Growth in all three has recovered somewhat from their record mid-year lows, but all three measures have yet to turn positive on even a six-month basis.

  Money growth is unlikely to turn higher until interest rates fall and the yield curve steepens. The 5.25% rise in interest rates since the Fed began tightening in March 2023 has caused loan demand to fall from a 12.2% growth rate a year ago to only a 3.8% rate last month. In addition, the inverted yield curve has created even less of an incentive for banks to lend. Banks, as financial intermediaries, normally borrow money short-term through deposits and CDs and lend that money long-term for such things as corporate loans, mortgages, and auto loans. An inverted yield curve implies that longer-term loans are financed at a loss since the cost of funds (CDs) is higher than the interest received on the loans. Add to that the fact that the Federal Reserve pays banks a market rate on balances held at the central bank which creates even less of an incentive for banks to lend.

- **The yield curve remains inverted**. The initial flattening of the yield curve from March 2022 through June 2023 – when the 3-30 curve moved from +212 to -135 basis points – occurred largely due to rising short-term interest rates. The Federal Funds rate over that period climbed a near-record 500 basis points. The 3-30 curve steepened sharply over the past summer as it moved from -136 to -32 basis points. While short-term interest rates rose only 25 basis points from May through October, the yield on the 30-year T-Bond soared over 1.30% (Chart 3). Much of that increase was due to the unexpected strength in the U.S. economy which caused bond traders to anticipate additional Fed rate hikes. Also, a surge in government borrowing helped keep upward pressure on long-term interest rates.

  Bond prices, however, rallied strongly in November as investors began pricing in the possible end of the Fed's tightening cycle and the likelihood of a real economic slowdown. The yield on the 30-year T-Bond fell almost 70 basis points from its

Chart 6

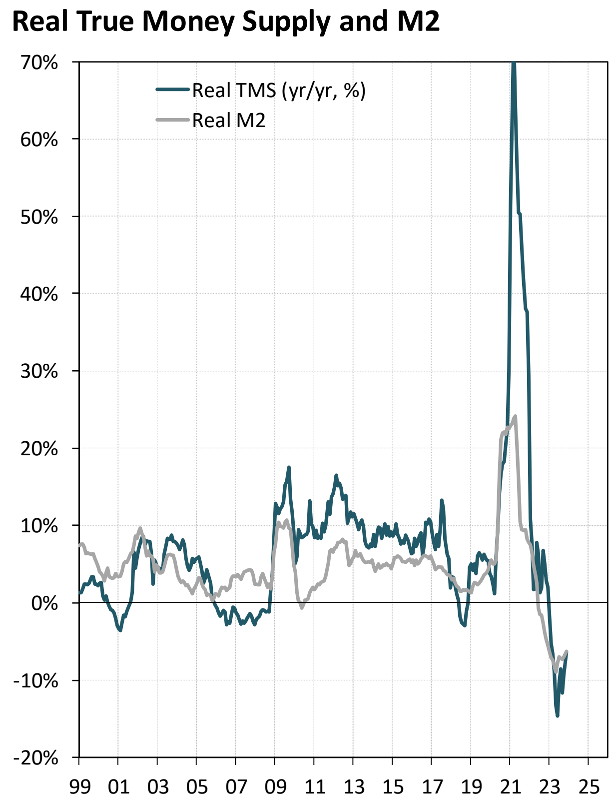
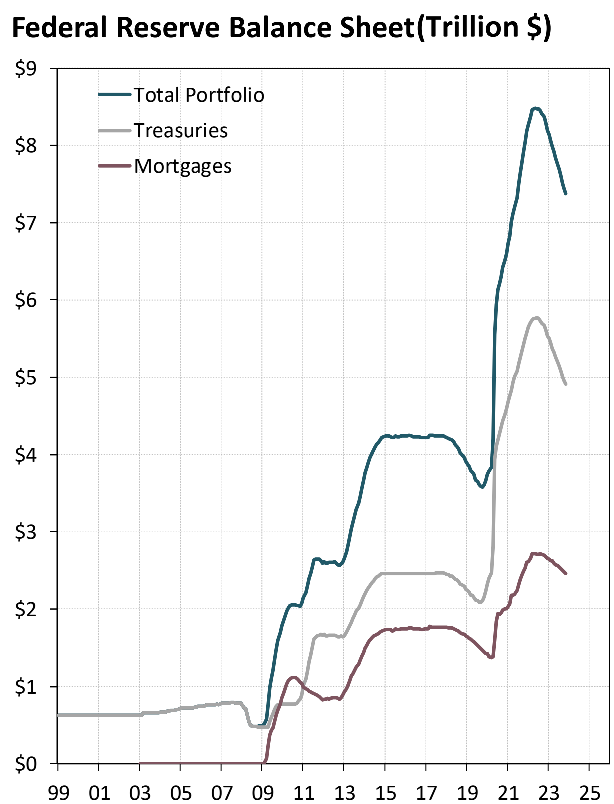


Chart 7



mid-November highs. The result was a renewed flattening of the yield curve. Long-term rates plummeted while short-term rates remained unchanged. In the short term, this renewed inversion of the yield curve indicates worsening liquidity. If lower long-term rates end up being an accurate predicator of Fed rate cuts, however, we are likely to see lower short- AND long-term rates and also a steeper yield curve which would support higher stock prices.

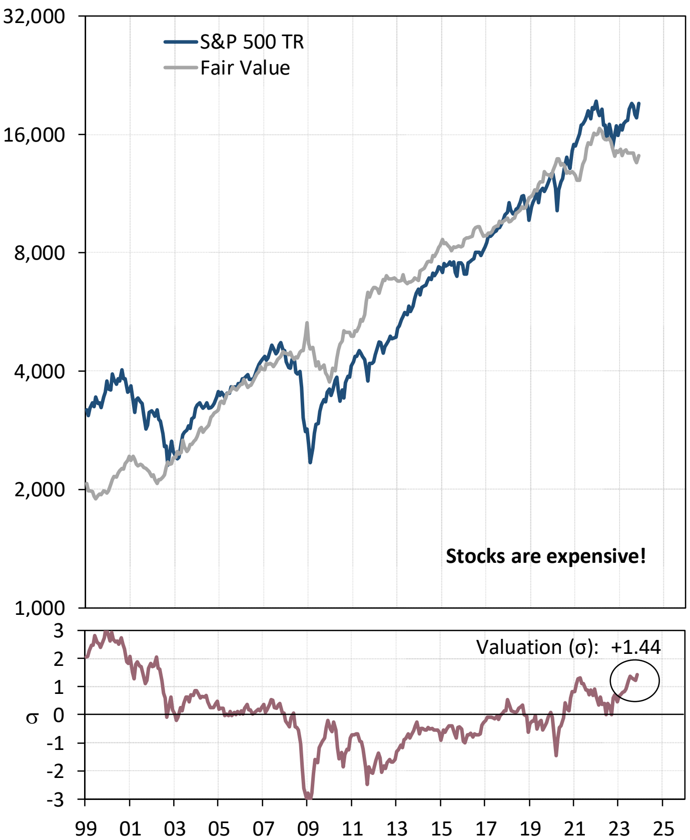
- **The Fed continues to reduce the size of its balance sheet**. The Federal Reserve reduced the size of its investment portfolio by an additional $64 billion last month (Chart 7). As part of its tightening process, the Federal Reserve has continued to shed Treasury securities and mortgages acquired during the Covid stimulus madness. The Fed's investment portfolio topped out at $8.5 trillion in June 2022. Through a combination of sales and runoffs, the Fed's portfolio has since fallen by over $1.1 trillion. While seemingly impressive, the portfolio still remains $3.6 trillion above its pre-Covid level suggesting that quite a lot of that stimulus is still around. We expect the Fed to continue to let the portfolio run off even if it chooses to cut rates early in 2024. This is likely to blunt some of the stimulus benefits of lower rates.

- **Stocks remain very overvalued**. Overvaluation is the greatest concern that we have about the longevity of any stock rally. It's at least plausible (if not likely) that an end to Fed rate hikes might be enough to spark a new bull market. The most extreme overvaluation since 2002, however, raises the question of just how far stocks could rise without pushing valuation to near-record levels (Chart 8).

The Gamma Equity Valuation Model indicates that the S&P 500 is currently 1.44 standard deviations overvalued (30%). The Nasdaq Model is a staggering 46% overvalued (1.55 standard deviations). A repeat of November's 8.9% gain would push equity valuation to the third highest level since WW II. The second highest, in 1973, ended with a 46% drop in the S&P 500 that until 2000-02 was the worst decline since the 1930's. The highest overvaluation occurred in February 2000 when the S&P 500 and Nasdaq hit 60% and 106% extremes, respectively. It took a 43% correction and 35 months for S&P 500 valuation to return to "neutral." **It also took almost thirteen years for the S&P 500 to reach a new high**. It took the Nasdaq 31 months and a 73% hit before it reached fair value. **It took the Nasdaq seven years to post a new high**.

In the case of the dot com collapse, valuation for the major indexes fell to just below neutral before a new bull market started. This has been the exception rather than the rule. **Most bear markets have not bottomed out until valuation has fallen to an average of 20% UNDERVALUED. It is almost impossible to devise a scenario in which valuation could reach neutral without another 20%+ correction**.

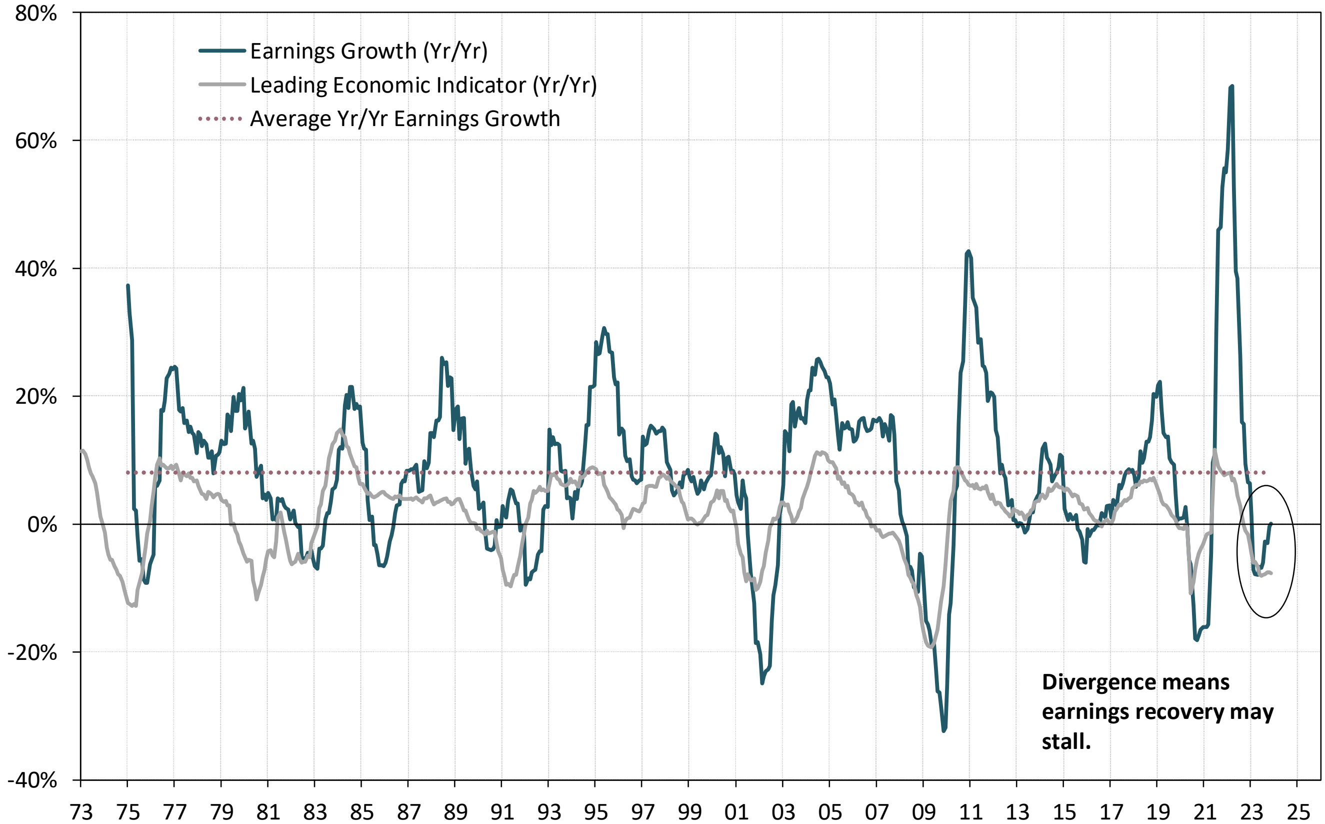
Chart 8
USA: S&P 500 Valuation



For example, a 3.0% drop in short-term rates and a 1.5% fall in long-term rates (which would restore a normal yield curve) would still leave the S&P 500 30% overvalued. Adding a 60% increase in earnings would bring valuation back to neutral. How that would happen given that earnings growth has averaged 9% a year since 1973 is anyone's guess. Add to that the likelihood that a slowing economy will also hurt earnings and it's almost impossible to come up with a scenario that doesn't involve a meaningful pullback even with aggressive Fed rate cuts.

Chart 9

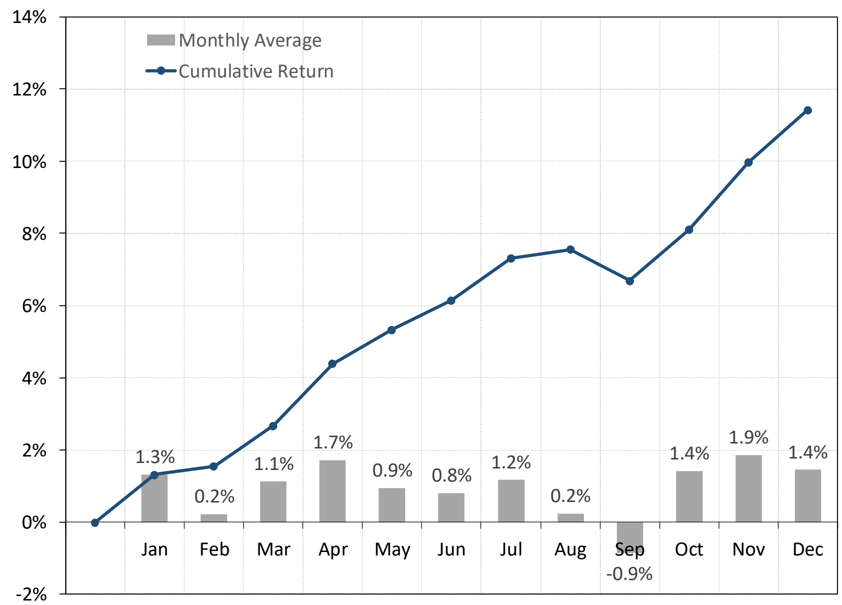
US Total Market Earnings Growth vs Leading Economic Indicator



- **Earnings are recovering but may turn lower if the economy slows.** Corporate earnings fell -8% from their Covid-stimulus-fueled-high in March 2022. Since bottoming in April 2023, 12-month trailing earnings have grown 4.8% and were unchanged in November on an yr/yr basis. If sustained, the recovery in earnings growth would provide support for additional stock price gains. The question is whether earnings can continue to recover given the 19-month drop in the Index of Leading Indicators. The LEI has historically led changes in corporate earnings by 6-12 months. With the LEI down -7.8% yr/yr and heading lower, the odds favor a second leg down in earnings growth (Chart 9).

Chart 10

Avg Mo Equity Returns: USA (1973 - Present)



- **Sentiment is mildly bullish.** While stocks have posted a solid recovery in November, market sentiment remains only moderately bullish. Long equity position by investment advisors, professional money managers, and individual investors were all less than one standard deviation above normal last month. The lack of extreme bullish sentiment suggests that the market has additional room to rally in the near term.

- **Seasonals are very bullish.** Equities are in the most bullish part of the year (Chart 10). November has historically been the strongest month of the year with the S&P 500 averaging a 1.92% gain. December has historically been up 1.43% with January up an additional 1.40%. There are two offsetting forces this year, however. Unusually strong or weak performance relative to seasonal patterns are often followed by corrections in the opposite direction in subsequent months. With stock prices jumping almost 9% in November, it's possible that December may experience a weaker-than-usual gain. Offsetting this is speculation over Fed rate cuts. The prospect of lower rates may provide an additional tailwind to favorable seasonals over the next several months.

II. Fixed Income Outlook

The 30-year Treasury Bond, Investment Grade Corporate, and High Yield Corporate Models all entered December long (lower yields, Charts 11-12). The 10-year T-Note remained neutral. The improved outlook for long-term interest rates was also not confined to the U.S. The German 10-year Bund Model also went long. The improved outlook for bonds is largely due to lower inflation numbers that have convinced investors that interest rates will come down next year.

Chart 11

USA: 10 Yr T-Note Model Forecast

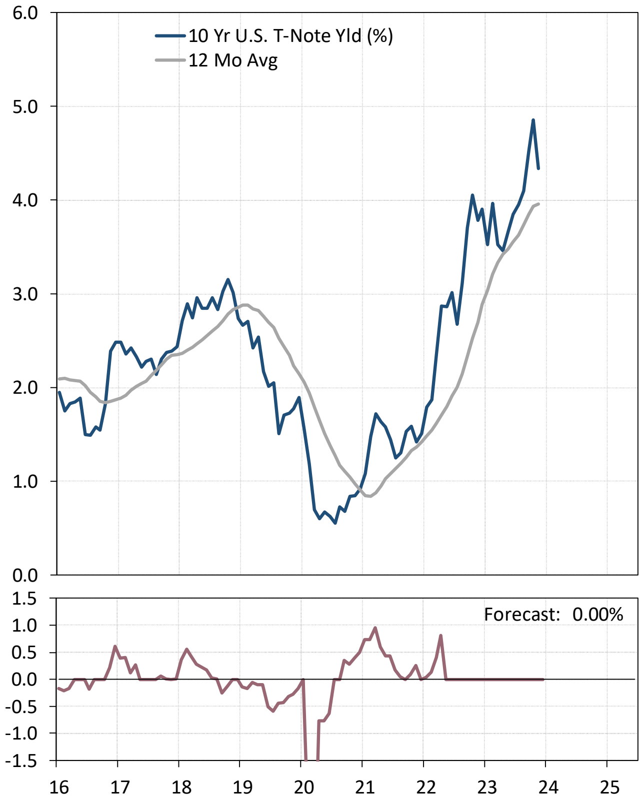
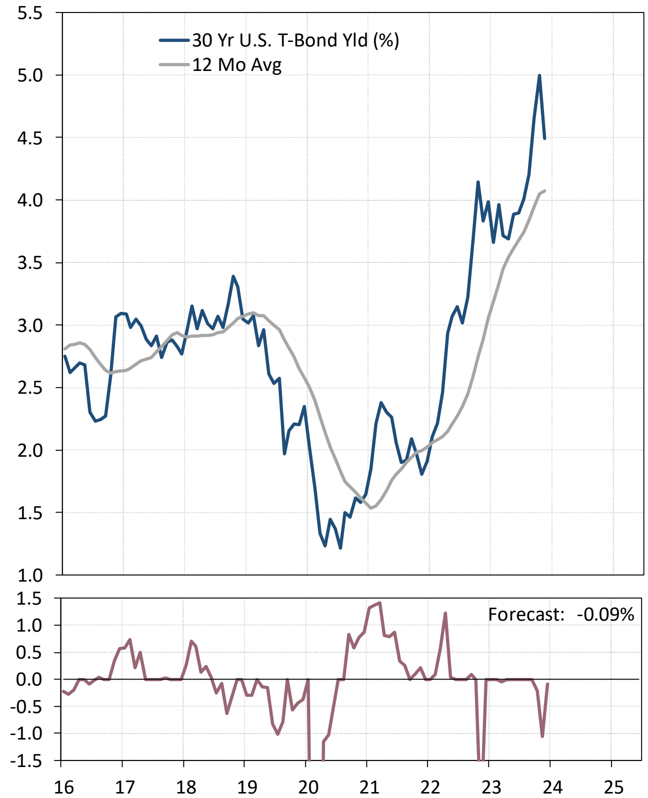


Chart 12

USA: 30 Yr T-Bond Model Forecast

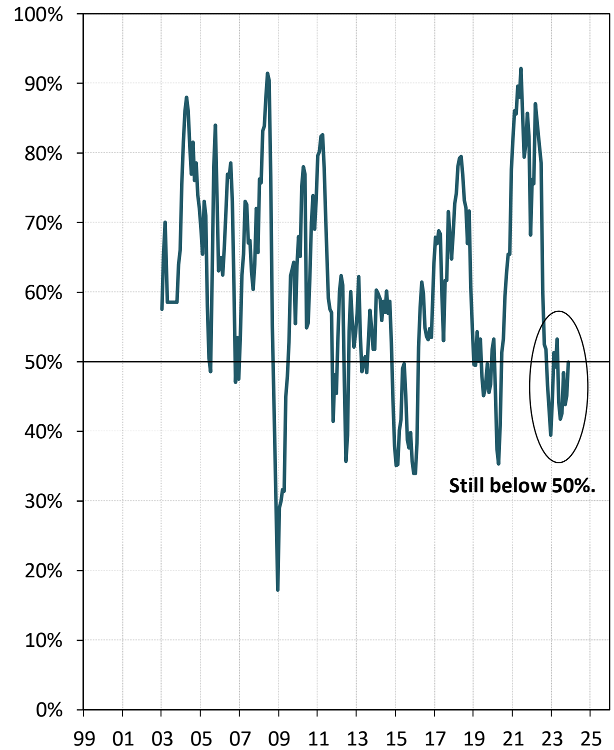


Interest rates are still high, but Fed tightening is close to over for this cycle. As we noted above, inflation slowed to a 3% yr/yr rate last month after three months of consolidation at a 3.4% rate. An uptick in energy and food prices in September and a huge 5.2% increase in third quarter GDP had raised concerns that inflation had bottomed at a 3.5% floor, well above the Fed's 2% target. Instead, inflation slowed more than expected in November causing investors to price in a series of rate cuts starting as early as next March.

- **Leading inflation measures have turned lower again**. After appearing to bottom in May, commodity prices have resumed their downtrend (Chart 5). The GSCI Commodity Index had risen four months in a row between May and September. The Index has now fallen the last two months and is again close to the May low. Industrial commodity prices, a leading indicator of overall economic activity as well as inflation, have fallen ten months in a row and are now at their lowest level since peaking in March 2022. The ISM survey of purchasing managers reporting lower input prices has been below "50" (more respondents reporting lower rather than higher prices) for the past seven months (Chart 13).

Chart 13

ISM Prices Paid Index



As noted earlier, the Index of Leading Economic Indicators has dropped 19 months in a row. Despite this the economy has managed to keep growing at over a 2% annual rate with employment in particular remaining buoyant. There are signs that this may be about to change. The ISM purchasing managers' survey of output in manufacturing has remained below "50" since October 2022. Last month's release was the third drop in a row and showed widespread weakness in orders and prices and a build-up of inventories. The ISM service sector survey has performed better but even so has hovered just above "50" for the past nine months. The economy has given enough head fakes over the past year to be suspicious that the current signs of weakness will be sustained. That said, the average lag between the LEI turning negative and the overall economy following has been nine months since 1960. The LEI turned negative in September 2022 – 14 months ago – so a sustained downturn is overdue. As we have noted in the past, **the LEI has never been down over -2% yr/yr without being followed by a recession**.

History has frequently shown that economic growth can change rapidly as the economy moves into recession. The first quarter of the last eight recessions saw on average -3.6% drop in real GDP even though the previous quarter averaged a +2.5% gain. The fact that the Atlanta Fed's GDP Now survey of fourth quarter GDP growth forecasts has plunged in the last two weeks suggests that this may finally be the case.

- **Bonds are still undervalued**. Last month's rally in bond prices caused yields to drop sharply from their mid-month highs. The result was that long-term instruments became substantially less undervalued (i.e., yields

Table 1

FIXED INCOME VALUATION vs FORWARD YIELD CHANGE ANALYSIS **Updated: 11/30/23**

Country	Debt Instrument	Yield Valuation (σ)	Price Valuation (%)	Valuation-Based Yield Change Forecasts (%) 1 Mo	3 Mo	6 Mo	1 Yr	2 Yr	3 Yr	5 Yr
USA	2 Yr T-Note	-0.46	0.5%	0.01	0.04	0.06	0.04	-0.02	-0.13	-0.32
USA	5 Yr T-Note	-0.08	0.3%	0.01	0.01	0.01	0.00	-0.09	-0.19	-0.38
USA	10 Yr T-Note	+0.30	-2.0%	-0.02	-0.05	-0.09	-0.19	-0.35	-0.42	-0.63
USA	30 Yr T-Note	+0.38	-5.6%	-0.02	-0.06	-0.11	-0.21	-0.37	-0.46	-0.68
USA	IG Corporate	+0.44	-1.9%	-0.02	-0.06	-0.12	-0.26	-0.53	-0.80	-1.11
USA	HY Corporate	-0.08	0.9%	0.00	-0.01	-0.02	-0.06	-0.15	-0.28	-0.63

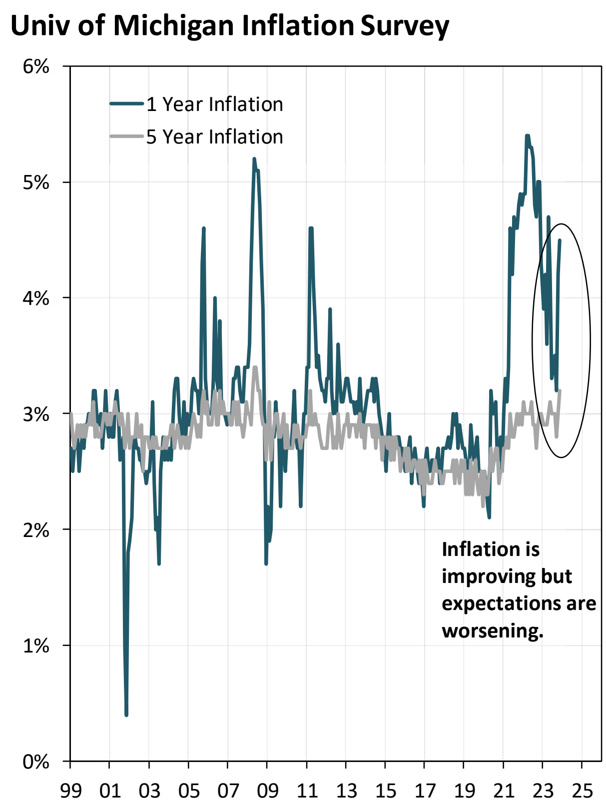
became less attractive). Even with this improvement, however, the long end of the yield curve (>10 years) is still moderately undervalued and yields still have room to fall further (Table 1). For example, the 10-year T-Note yield, currently 4.35%, would need to fall to 3.90% for valuation to reach neutral. The yield on the 30-year T-Bond would need to fall another 35 basis points to 4.10% to reach neutral valuation.

- **Bond seasonals favor lower rates**. Bond yields have historically fallen through year-end before turning sharply higher from January through May.

The overall outlook for bonds has improved over the last several weeks due to the unexpectedly large improvement in the PCE inflation rate. While leading inflation indicators suggest that further improvement is possible (and even likely), bond investors should be aware of two major caveats:

- **The wildcard: worsening inflation expectations**. The inflation outlook improved last month with both the yr/yr PCE rate and several leading inflation indicators heading lower. Moving in the opposite direction, however, are inflationary expectations. The University of Michigan's monthly survey of inflation expectations worsened sharply over the past two months (Chart 14) . Headline PCE inflation rate has dropped from a 3.4% rate in September to a 3.0% rate in November, but inflation expectations have gone in the opposite direction. The Michigan survey showed one-year inflation expectations jumping from a 3.2% rate in September to 4.5% last month – a startling 1.3% increase at a time when most other inflation measures improved. The five-year inflation expectation jumped from 2.8% to 3.2% - a huge increase over a two-month period. The one-year survey has historically forecasted the one-year forward inflation rate with 82% accuracy, though it has tended to overestimate the actual inflation rate by about 0.6% a year since 2009.

Chart 14



- **Government borrowing vs Quantitative Tightening**. The Treasury Department raised over $1.7 trillion in new money during the first two quarters of the current fiscal year. That propelled total debt outstanding to a record $33.2 trillion which prompted a cut in the government's credit rating. The Treasury Borrowing Advisory Committee (TBAC) announced that it will be selling an additional net $776 billion in Q4 2023 and $816 billion in Q1 2024 – an additional $1.07 trillion in the next four months alone.

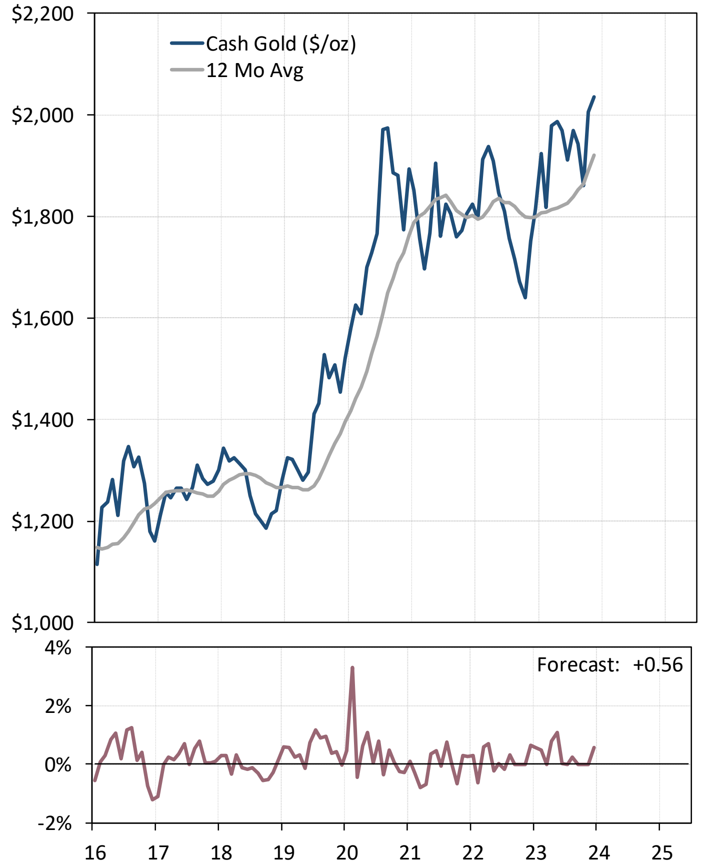
  Last month's inflation improvement and the resulting hopes for earlier-than-later Fed rate cuts diverted the market's attention from these ballooning deficits. The deficits are likely to fly under the radar as long as the economy slows and inflation converges towards the Fed's 2% target. Any sign that inflation is not cooperating could quickly draw attention back to a level of government borrowing that remains entirely out of control. Moreover, the federal government's financing needs are clashing with the Fed's desire to reduce its investment portfolio. As mentioned earlier, the Fed's portfolio shrank another $64 billion last month. Given that the portfolio is still $3.6 billion above its pre-Covid level, we would expect the Fed to continue to reduce the size by $60 billion a month. Under these circumstances, any uptick in inflation or accelerating economic growth could see yields quickly bounce back.

III. Gold and Precious Metals Outlook

The Gamma Gold Model went long for December after being neutral last month. The Model joined silver and platinum on the long side (Chart 15). A combination of favorable valuation and the prospect of interest rate cuts early next year has helped propel the precious metals complex higher.

Chart 15

Gold Model Forecast



- **<u>An interest rate market</u>**. Gold rallied 1.5% in November and ended the month up 10% from its September low. Virtually the entire rally has been due to expectations that interest rates will begin to ease early next year. Gold has historically been one of the longest leading indicators of interest rate changes especially through their impact on the yield curve. Gold has been strongly influenced by persistent steepenings and flattenings of the yield curve. The recent rally reflects expectations that liquidity will improve as short-term interest rates fall relative to long-term rates. Coincidentally, periods of yield curve flattening have preceded accelerations in money growth which has also tended to support higher precious metals prices.

  The major risk to further interest-driven price gains is that investors may have gotten too far ahead of themselves. As recently as October, markets were seriously entertaining the odds of a December Fed rate hike. Now, expectations have swung in favor of two rate cuts by May with even the (small) possibility of a rate cut in January. With these expectations already priced into the interest rate term structure, any event that contradicts the slowing inflation / slowing growth scenario would likely trigger a nasty short-term correction.

- **<u>Still favorable valuation</u>**. The last two months' gold rally has caused undervaluation to improve from one to 0.84 standard deviations below fair value (Table 2). That still leaves gold about 20% undervalued. The Gamma Valuation Model indicates that spot gold would need to rally another $400 to about $2,450/oz to reach its fair-value level.

  Historically, extremes of valuation have tended to be followed by overshoots in the opposite direction. We believe that gold is likely to overshoot to at least one standard deviation into overvalued territory. That would carry gold to over $3,050/oz – a rise of another 50%. For that reason, we continue to encourage investors to add to long positions on any major dips.

Table 2

PRECIOUS METALS VALUATION

Commodity	Valuation (σ)	Valuation (%)
Gold	-0.84	-20%
Silver	-0.58	-20%
Platinum	-1.69	-50%
Palladium	-1.43	-60%

- **<u>Seasonals are very supportive of further price gains</u>**. Gold has historically rallied strongly from November through January. Since 1973, gold has averaged a 1.1% gain in December followed by an even stronger 1.3% rise in January.

- **<u>Sentiment is positive but not extreme</u>**. The Gamma Sentiment Indicator shows gold sentiment to be about 0.6 standard deviations above normal. Periods of moderate positive sentiment have historically been followed by additional price gains. The Valuation Indicator indicates accelerating price gains over the next 12 months – another reason to add to long positions on weakness.

IV. Foreign Exchange Outlook

The Gamma EUR/USD Model remained short the euro (long USD) for December for the fifth month in a row (Chart 16). With both the Federal Reserve and European Central Bank (ECB) now solidly in "pause" mode, the exchange rate is likely to remain range-bound for the immediate future. The next major move will likely be determined by which central bank blinks first and starts to ease more aggressively.

- **Monetary policies are in neutral, but U.S. has the interest rate edge.** Both the Federal Reserve and European Central Banks have paused their rate hikes. Inflation in both regions has converged to their 2% target faster than expected. Bank of France Governor Francois Villeroy de Galhau said recently "barring any shock, rate hikes are now over." Villeroy's comments came after data showed Eurozone inflation last month eased to a 2.4% annual rate, the lowest reading since mid-2021. As with Fed Chairman Powell's recent comments, markets shrugged off the cautious views of more hawkish ECB members. Odds now favor a 25 basis points cut in European rates by March with markets pricing in a full 125 basis points by the end of 2024.

Chart 16
EUR/USD Model Forecast

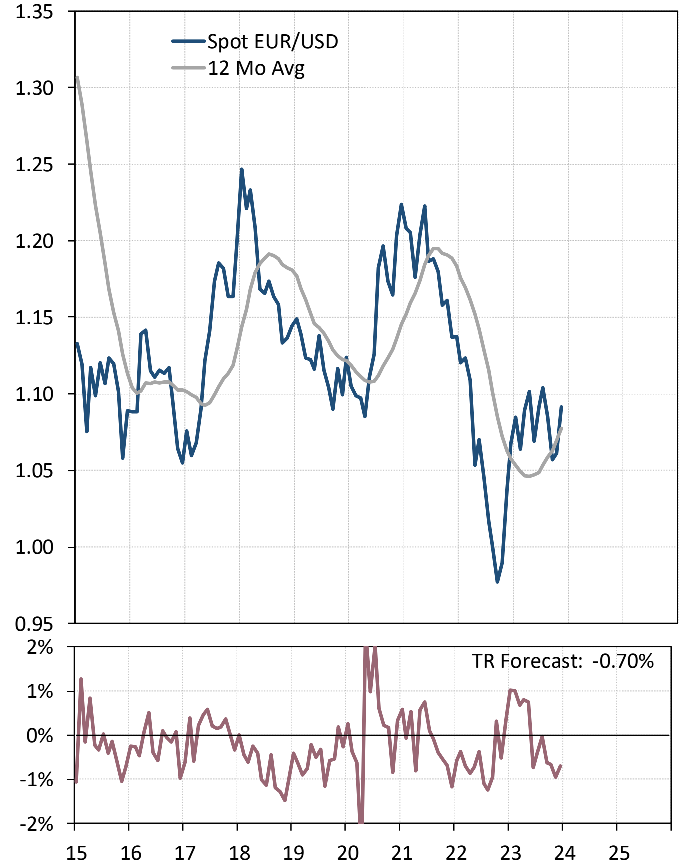
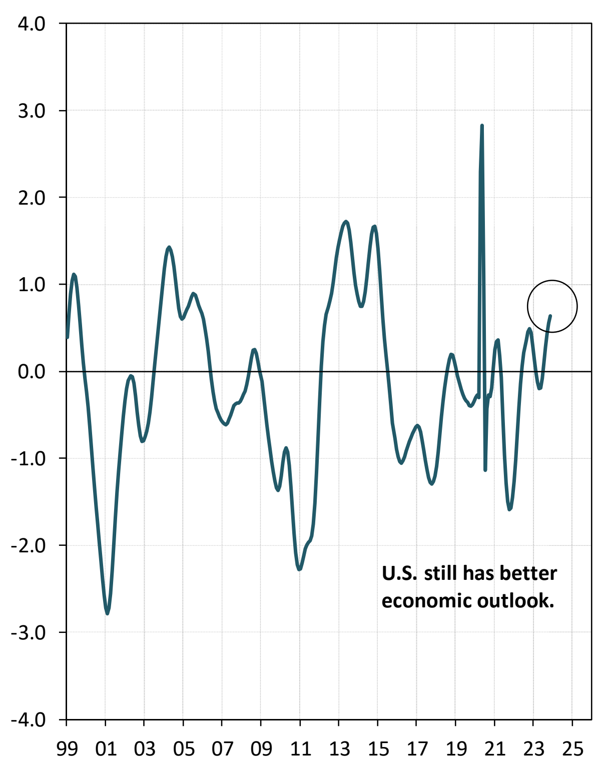


Chart 17
Relative LEI: U.S. vs Eurozone



With dueling monetary policies winding down, the dollar still retains a substantial interest rate advantage over the euro. The U.S. three-month interest rate was 1.5% above euro rates at the end of November. The spread on 10-year government bonds was even wider at 1.89%. In the face of no changes in the differential, the positive spread in favor of the dollar is likely to underpin the U.S. currency until the future direction in relative interest rates becomes clearer.

- **The U.S. economy continues to outperform.** We discussed above that U.S. growth may finally be slowing after 19 consecutive monthly declines in the LEI. Compared to Europe, however, the U.S. continues to outperform. The OECD's alternative leading indicator for the U.S., while still negative, has slowly edged up since bottoming in February. The composite OECD leading indicator for Germany, France, and Italy, however, put in a new low for this cycle last month. That suggests that the Eurozone economy is still far from bottoming which may encourage a more aggressive reduction in interest rates as long as inflation does not reaccelerate.

Table 3
EQUITY VALUATION

Country / Index	Valuation (σ)	Valuation (%)
United States	+1.54	+31%
S&P 500	+1.44	+30%
Nasdaq	+1.66	+46%
S&P 600 Small Cap	-0.57	-9%
Europe	-2.19	-50%
Germany	-1.87	-40%
France	+0.11	+2%
Italy	-1.33	-33%
Switzerland	-2.08	-41%
UK	-0.16	-4%

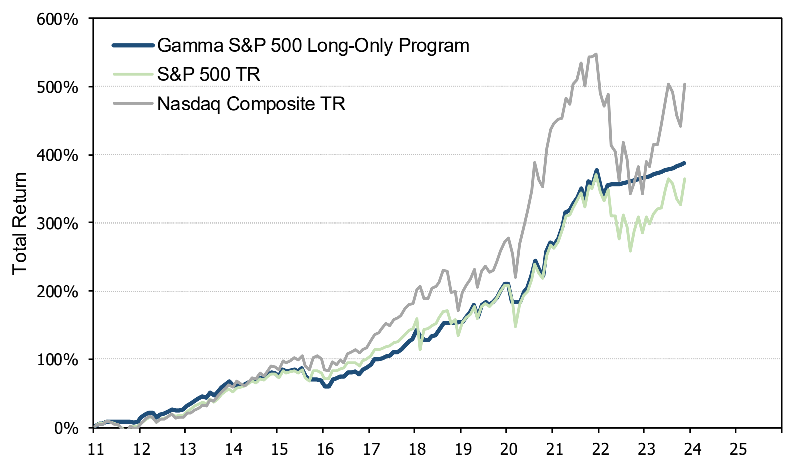
- **European capital inflows may offset the adverse effect of lower eurozone rates on the euro**. Weaker European growth may encourage the ECB to cut rates more aggressively than the Federal Reserve. That, however, doesn't automatically imply a weaker euro. Compared to U.S. equities, European stocks are a screaming bargain. The S&P 500 according to the Gamma Equity Valuation Model is 30% overvalued. In contrast, the Euro Stoxx 600 index is a whopping 50% **undervalued** (Table 3). Such an extreme discrepancy may encourage enough capital inflows into Europe to offset any adverse effect of lower interest rates on the currency.

-Karl Chalupa

Mr. Chalupa is the CIO and Co-Founder of Gamma Investment Consulting and Editor of the Gamma Intelligence Reports. He is also President of Gamma Capital LLC, a quantitative global macro investment firm. Mr. Chalupa developed the Gamma Investment Program used for previously trading the firm's $400 million global macro program. He was previously Director of Risk Management at Titan Advisors LLC, a $4.5 billion alternative investments firm. Mr. Chalupa was also Managing Director of the Currency and Alternative Investment Strategies Groups at State Street Global Advisors (SSGA) where he developed a $9 billion currency overlay program and launched SSGA's first hedge fund based on his Gamma Model. Mr. Chalupa spent 13 years at ABN Amro Bank where he traded interest rate and currency derivatives and was Manager of the Proprietary Trading and Economic Research Desk. He began his career as an economist for the Federal Reserve Bank of Chicago. Mr. Chalupa holds an MA in Economics from Brown University, graduated magna cum laude from Northern Illinois University with BAs in Economics and Political Science, and is Series 3 registered.

Gamma Model Performance Summary – November 2023

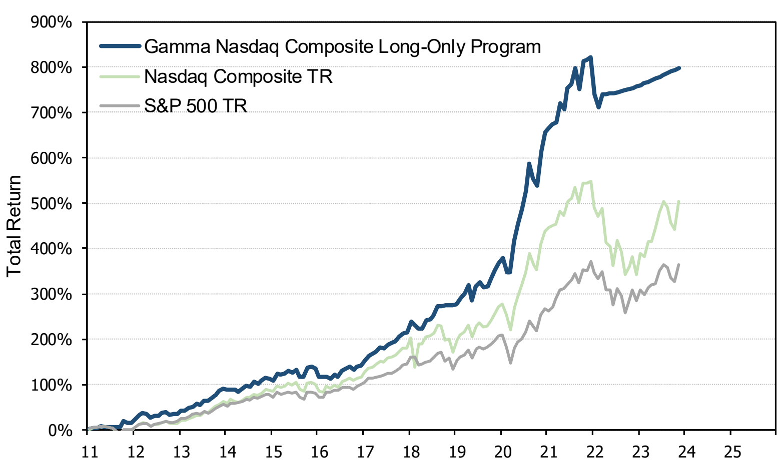
Gamma S&P 500 Long-Only Program — Jan 2011 - Nov 2023



Historical Performance	Program	BM1	BM2
Compound ROR	13.0%	12.6%	14.9%
Cumulative Return	487.5%	365.0%	503.3%
Cumulative VAMI	$4,875	$4,650	$6,033
Best Month	10.9%	13.9%	20.7%
Worst Month	-8.2%	-17.7%	-20.9%
% Positive Months	79.4%	69.7%	65.2%
Historical Risk	**Program**	**BM1**	**BM2**
Standard Deviation	9.7%	15.8%	18.9%
Sharpe Ratio (1.0% RFR)	1.03	0.61	0.63
Sortino Ratio (1.0% RFR)	1.40	0.95	1.07
Downside Deviation	7.2%	10.1%	11.1%
Maximum Drawdown	-14.1%	-23.8%	-31.8%
Months In Maximum Drawdown	18	23	23

BM1: S&P 500 Total return
BM2: Nasdaq Composite Total Return

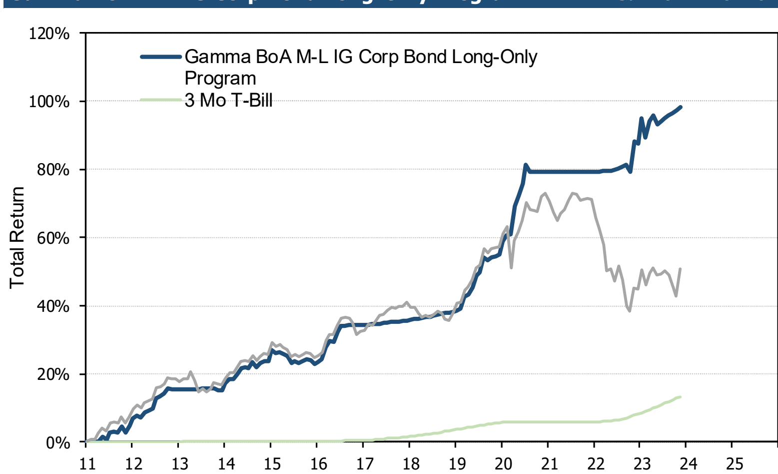
Gamma Nasdaq Composite Long-Only Program — Jan 2011 - Nov 2023



Historical Performance	Program	BM1	BM2
Compound ROR	18.5%	14.9%	12.6%
Cumulative Return	897.5%	503.3%	365.0%
Cumulative VAMI	$8,975	$6,033	$4,650
Best Month	15.5%	20.7%	13.9%
Worst Month	-9.0%	-20.9%	-17.7%
% Positive Months	78.1%	65.2%	69.7%
Historical Risk	**Program**	**BM1**	**BM2**
Standard Deviation	12.7%	18.9%	15.8%
Sharpe Ratio (1.0% RFR)	1.22	0.63	0.61
Sortino Ratio (1.0% RFR)	1.85	1.07	0.95
Downside Deviation	8.4%	11.1%	10.1%
Maximum Drawdown	-12.0%	-31.8%	-23.8%
Months In Maximum Drawdown	23	23	23

BM1: Nasdaq Composite Total Return
BM2: S&P 500 Total Return

Gamma BoA M-L IG Corp Bond Long-Only Program — Jan 2011 - Nov 2023



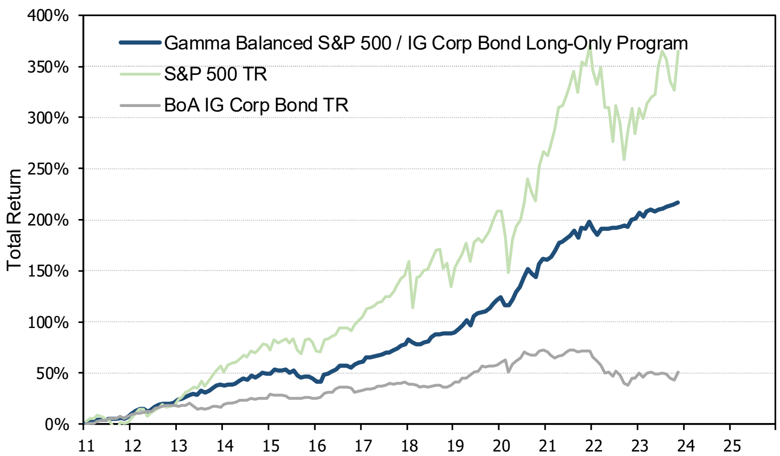
Historical Performance	Program	BM1	BM2
Compound ROR	5.4%	1.0%	3.2%
Cumulative Return	198.3%	13.4%	50.8%
Cumulative VAMI	$1,983	$1,134	$1,508
Best Month	5.3%	0.4%	5.6%
Worst Month	-2.9%	0.0%	-7.5%
% Positive Months	83.9%	100.0%	60.6%
Historical Risk	**Program**	**BM1**	**BM2**
Standard Deviation	3.8%	0.4%	6.2%
Sharpe Ratio (1.0% RFR)	0.64	---	0.04
Sortino Ratio (1.0% RFR)	1.02	---	0.05
Downside Deviation	2.4%	---	4.9%
Maximum Drawdown	-3.3%	0.0%	-20.1%
Months In Maximum Drawdown	27	0	28

BM1: 3 Mo T-Bill
BM2: BofA M-L Investment Grade Corp Bond Index

Past performance is not indicative of future results

Gamma Model Performance Summary – November 2023

Gamma S&P 500 / IG Corp Bond Long-Only Program **Jan 2011 - Nov 2023**



Historical Performance	Program	BM1	BM2
Compound ROR	9.3%	12.6%	3.2%
Cumulative Return	316.5%	365.0%	50.8%
Cumulative VAMI	$3,165	$4,650	$1,508
Best Month	5.5%	13.9%	5.6%
Worst Month	-3.5%	-17.7%	-7.5%
% Positive Months	79.4%	69.7%	60.6%
Historical Risk	**Program**	**BM1**	**BM2**
Standard Deviation	5.2%	15.8%	6.2%
Sharpe Ratio (1.0% RFR)	1.21	0.61	0.04
Sortino Ratio (1.0% RFR)	1.94	0.95	0.05
Downside Deviation	3.3%	10.1%	4.9%
Maximum Drawdown	-7.8%	-23.8%	-20.1%
Months In Maximum Drawdown	13	23	28

BM1: S&P 500 Total Return
BM2: BofA M-L Investment Grade Corp Bond Index Total Return

Past performance is not indicative of future results

Gamma Macro Model Forecasts for December 2023

1 MONTH STOCK INDEX MODEL FORECASTS (%)

Country	Stock Index	Price	1 Mo Forecast	Previous Forecast	Position	Trade	Updated
USA	S&P 500	4,550.58	0.00%	-0.81%	Neutral	Cover Short	11/30/23
USA	Nasdaq	14,232.56	0.00%	-1.68%	Neutral	Cover Short	11/30/23
USA	Russell 2000	na	na	na	Long	Hold	11/30/23
Canada	S&P/TSX 60	1,214.20	0.00%	0.00%	Neutral	Hold	11/30/23
Mexico	IPC	53,036.65	+1.74%	0.00%	Long	Buy	11/30/23
Brazil	Bovespa	126,213.85	0.00%	0.00%	Neutral	Hold	11/30/23
Japan	TOPIX	2,374.93	0.00%	+0.16%	Neutral	Cover Long	11/30/23
China	Hang Seng CEI	5,857.54	+1.01%	0.00%	Long	Buy	11/30/23
Hong Kong	Hang Seng	16,223.94	0.00%	0.00%	Neutral	Hold	11/30/23
S. Korea	KOSPI	2,535.29	-1.53%	0.00%	Short	Sell	11/30/23
India	Nifty 500	17,987.95	+1.61%	+1.57%	Long	Hold	11/30/23
Australia	S&P/ASX 200	7,087.30	0.00%	0.00%	Neutral	Hold	11/30/23
Europe	STOXX 600	461.52	0.00%	0.00%	Neutral	Hold	11/30/23
UK	FTSE 100	7,472.92	+1.26%	0.00%	Long	Buy	11/30/23
Germany	DAX	16,223.94	0.00%	0.00%	Neutral	Hold	11/30/23
France	CAC 40	7,315.43	0.00%	-0.15%	Neutral	Cover Short	11/30/23
Italy	FTSE/MIB 30	29,813.44	0.00%	0.00%	Neutral	Hold	11/30/23
Switzerland	Swiss Market	10,841.92	0.00%	0.00%	Neutral	Hold	11/30/23
Russia	RTS 50	1,115.18	0.00%	0.00%	Neutral	Hold	11/30/23
S. Africa	FTSE/JSE 40	69,647.14	0.00%	+2.18%	Neutral	Cover Long	11/30/23

1 MONTH FIXED INCOME MODEL PRICE CHANGE FORECASTS (%)

Country	Debt Instrument	Current Yield (%)	Price Change Forecasts (%) 1 Month	Price Change Forecasts (%) Previous	Bond Position	Trade	Updated
USA	2 Yr T-Note	4.72	0.00%	-0.04%	Neutral	Cover Short	11/30/23
USA	5 Yr T-Note	4.30	-0.00%	-0.15%	Short	Hold	11/30/23
USA	10 Yr T-Note	4.34	0.00%	0.00%	Neutral	Hold	11/30/23
USA	30 Yr T-Note	4.49	+0.09%	+1.06%	Long	Hold	11/30/23
USA	IG Corporate	5.64	+0.53%	0.00%	Long	Buy	11/30/23
USA	HY Corporate	8.45	+0.74%	0.00%	Long	Buy	11/30/23
Canada	10 Yr Govt	3.58	0.00%	0.00%	Neutral	Hold	11/30/23
Mexico	10 Yr Cetes	9.23	0.00%	0.00%	Neutral	Hold	11/30/23
Brazil	10 Yr Govt	10.89	-0.11%	-1.17%	Short	Hold	11/30/23
Japan	10 Yr JGB	0.68	0.00%	0.00%	Neutral	Hold	11/30/23
Australia	10 Yr Govt	4.50	0.00%	0.00%	Neutral	Hold	11/30/23
S. Korea	10 Yr Govt	3.70	-0.03%	0.00%	Short	Sell	11/30/23
China	10 Yr Govt	2.69	0.00%	0.00%	Neutral	Hold	11/30/23
India	10 Yr Govt	7.28	0.00%	0.00%	Neutral	Hold	11/30/23
Germany	10 Yr Bund	2.48	+0.11%	0.00%	Long	Buy	11/30/23
France	10 Yr OAT	3.06	0.00%	-0.04%	Neutral	Cover Short	11/30/23
Italy	10 Yr BTP	4.25	0.00%	-0.15%	Neutral	Cover Short	11/30/23
Switzerland	10 Yr Conf	0.90	0.00%	0.00%	Neutral	Hold	11/30/23
UK	15 Yr Gilt	4.52	+0.39%	+0.30%	Long	Hold	11/30/23
Russia	10 Yr Govt	12.10	0.00%	0.00%	Neutral	Hold	11/30/23
S. Africa	10 Yr Govt	9.98	0.00%	0.00%	Neutral	Hold	11/30/23

Gamma Macro Model Forecasts for December 2023

1 MONTH FX MODEL FORECASTS (%)

Currency	Spot FX Rate	1 Mo Forecast	Previous Forecast	Position	Trade	Updated
EUR/USD	1.0914	-0.70%	-0.95%	Short	Hold	11/30/23
GBP/USD	1.2640	-0.45%	-0.13%	Short	Hold	11/30/23
USD/CHF	0.8734	+0.94%	+0.72%	Long	Hold	11/30/23
USD/NOK	10.7421	+1.19%	+0.64%	Long	Hold	11/30/23
USD/SEK	10.4726	+0.48%	+1.21%	Long	Hold	11/30/23
USD/JPY	148.15	0.00%	0.00%	Neutral	Hold	11/30/23
AUD/USD	0.6616	-0.45%	-0.16%	Short	Hold	11/30/23
NZD/USD	0.6165	-0.15%	-0.58%	Short	Hold	11/30/23
USD/KRW	1,298.35	+0.93%	+0.47%	Long	Hold	11/30/23
USD/CNY	7.1333	+0.05%	+0.73%	Long	Hold	11/30/23
USD/INR	83.39	-0.19%	+0.37%	Short	Cover Long & Sell	11/30/23
USD/SGD	1.3361	+0.64%	+0.22%	Long	Hold	11/30/23
USD/CAD	1.3572	+0.28%	+0.26%	Long	Hold	11/30/23
USD/BRL	4.9252	+1.16%	0.00%	Long	Buy	11/30/23
USD/MXN	17.37	0.00%	0.00%	Neutral	Hold	11/30/23
USD/RUB	89.53	-2.00%	-2.86%	Short	Hold	11/30/23
USD/ZAR	18.86	+1.55%	+0.96%	Long	Hold	11/30/23
BTC/USD	37,665	+0.77%	+6.37%	Long	Hold	11/30/23

1 MONTH COMMODITY PRICE FORECASTS (%)

Commodity	Cash / Futures Price ($)	1 Month Forecast	Previous Forecast	Position	Trade	Updated
Gold	$2,036.19	+0.56%	0.00%	Long	Buy	11/30/23
Silver	$25.13	+0.24%	+0.37%	Long	Hold	11/30/23
Platinum	$924.91	+0.89%	0.00%	Long	Buy	11/30/23
Palladium	$1,014.88	-1.29%	-3.15%	Short	Hold	11/30/23
Aluminum	$2,251.51	0.00%	0.00%	Neutral	Hold	11/30/23
Copper	$8,103.00	0.00%	0.00%	Neutral	Hold	11/30/23
Lead	$2,064.75	0.00%	0.00%	Neutral	Hold	11/30/23
Nickel	$20,865.50	0.00%	0.00%	Neutral	Hold	11/30/23
Tin	$25,867.00	0.00%	0.00%	Neutral	Hold	11/30/23
Zinc	$2,287.77	0.00%	0.00%	Neutral	Hold	11/30/23
LME COMPOSITE	---	0.00%	0.00%	Neutral	Hold	11/30/23
WTI Crude Oil	$76.58	0.00%	0.00%	Neutral	Hold	11/15/23
HH Natural Gas	$2.880	-2.40%	-2.36%	Short	Hold	11/20/23

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