Central Banking Liquidity – QE back?

April 2023

Executive Summary

- We review the relationship between Quantitative Easing (QE) program and equity performance, and implications moving forward
    - Illustrates how QE has driven SPX performance post 2008 via currency debasement (market flooded with dollar liquidity)
- Fed started Quantitative Tightening in 2022 to wind down their balance sheet and fight inflation. However, regional banking crisis created the need for another liquidity infusion
    - QE appears to be back in a new form called the Bank Term Funding Program (BTFP)
    - If QE is back, we may have already witnessed the market bottom
    - Current fiscal path may be unsustainable long term

Quantitative Easing and Tightening Cycles

- This chart illustrates the massive expansion of the Fed balance sheet, and resulting liquidity injection into the US economy ($893bn in 2008 to $8.6 trillion today)
- SPX +470%, NDX +1029% since QE began (Nov. 2018)

Source: Bloomberg

Quantitative Easing and Tightening Cycles (continued)

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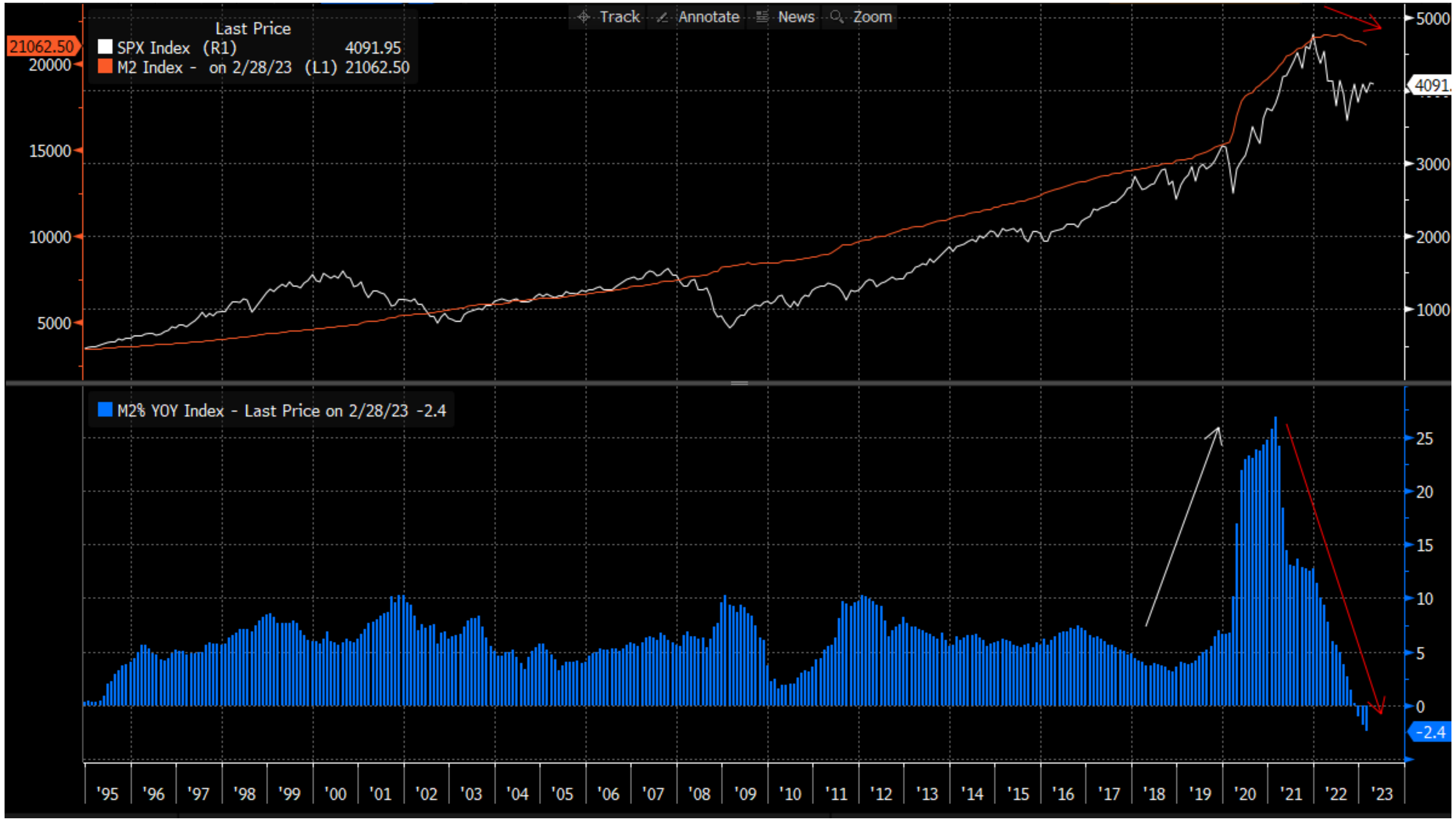
- M2 measures the nation's overall stash of cash, coins, bills, bank deposits, and money market funds, and is basically the broadest measure of cash and cash-like liquid assets (M2 measured in $trillions)
- The Federal reserve injected trillions into the economy starting in 2008 to aid in the economic recovery with several QE programs and with interest rates near 0; the exact figure is difficult to estimate
- Fed embarks on quantitative tightening (QT) in 2022 to fight inflation
- U.S. money supply is now falling at its fastest rate since the 1930s (contracted for the first time in December since the 1940s), with, causing stresses in the economy

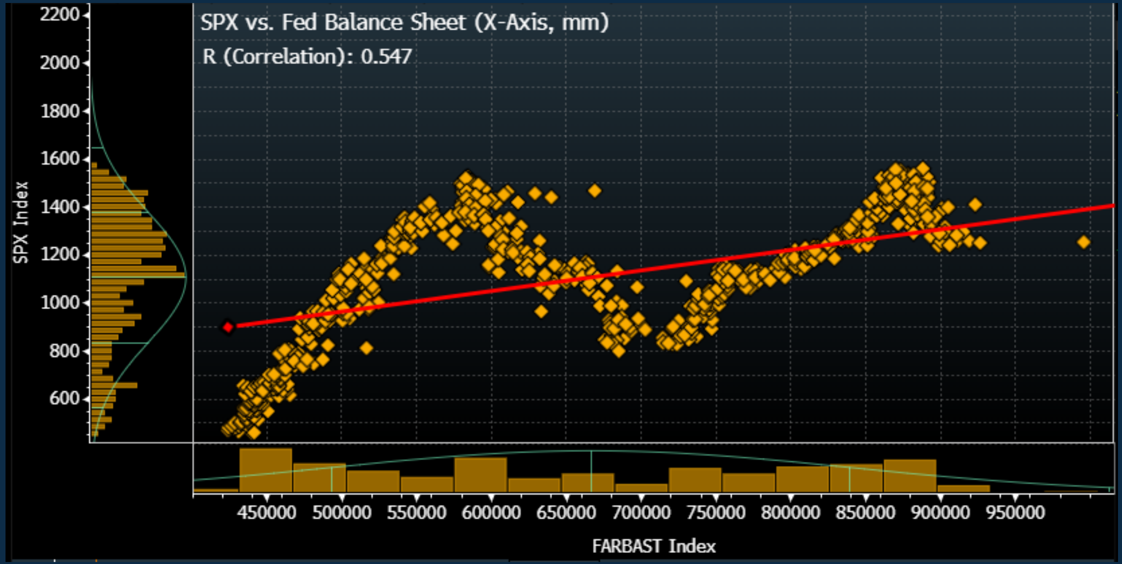


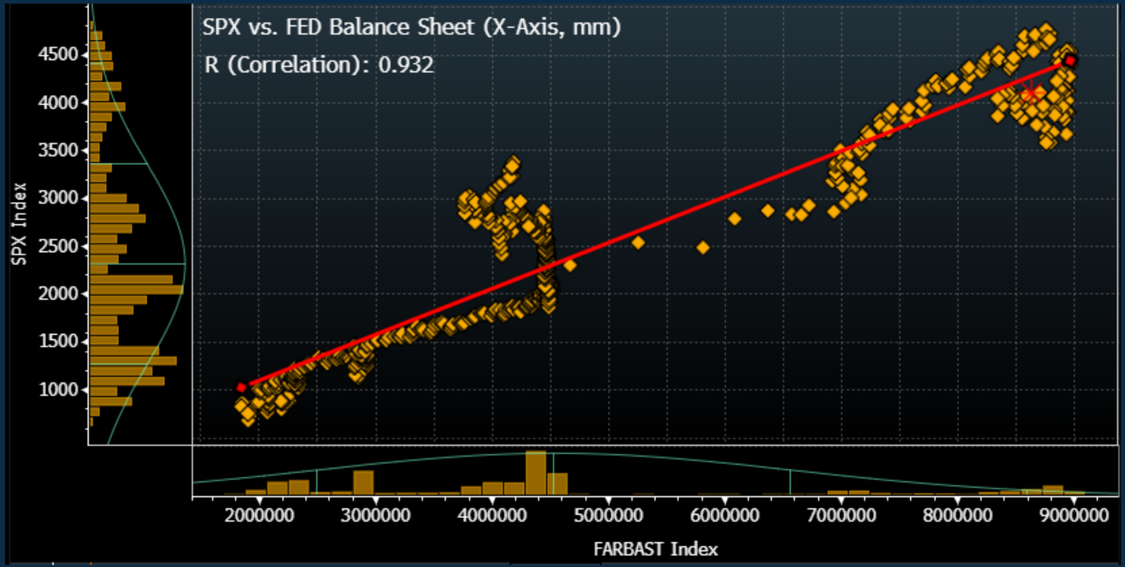
Source: Bloomberg; Column: US money supply falling at fastest rate since 1930s | Reuters

Regression – SPX vs. Fed Balance Sheet Pre and Post QE

- Strong correlation as one would expect between SPX and the Fed balance sheet
- SPX vs. Fed Balance Sheet Pre QE: 12/28/1994 to 10/30/2008 ->
  - Correlation 0.547

- After the financial crisis, we entered the era of cheap money with QE, low interest rates, and negative real yields
- The correlation between SPX and the Fed balance sheet increased significantly
- SPX vs. Fed Balance Sheet Post QE: 11/1/2008 to 4/12/2023 ->
  - Correlation 0.932





Source: Bloomberg

SPX Returns During the Era of Easy Money

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- If we normalize SPX returns by the fed balance sheet (which has vastly expanded), SPX has only grown 2%/year in this time (approximated by dividends)
- Using this as a return framework for the period, SPX returns in the period could thus be inferred to be from currency debasement (e.g. more dollars circulating per unit of SPX), rather than growth and innovation stemming from SPX constituents as a whole

Source: Bloomberg

Nasdaq Returns During the Era of Easy Money

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- Nasdaq paints a different picture – NDX has returned 7.5%/year after normalizing for the Fed balance sheet
- Growth and innovation in the economy has come primarily from tech sector. Secular innovation themes (e.g. computing, AI, robotics, Web3, blockchain, cyber security, etc.) should continue to drive growth moving forward

Source: Bloomberg

BFTP: New Form of Quantitative Easing (QE)?

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- Bank Term Funding Program (BFTP):
  - When in need of capital, eligible banks can borrow against their securities (UST, MBS) instead of selling them in open mkt
  - No haircut; can borrow up to 100% of collateral valued at par
  - Rate is 1 year overnight swap rate (OIS) + meager 10bps
  - No prepayment penalty
  - Loan term 1 year
  - No transaction fees
  - US Treasury backstops the program
  - Program in effect until at least March 11th, 2024*
  - Entirely confidential until at least one year after the end of the program, so no stigma attached (unlike if a bank utilizes the Fed discount window to borrow)

*An additional $148bn had been lent from the discount window ($4-5bn is typical) during regional banking crises

*An additional $143bn was lent to holding companies to make depositors whole

*Overall >$300bn was injected into the economy (liquidity injection partially reverses effects of QT)

Source: Bloomberg

Have we witnessed the market bottom?

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- Will we revert back to trend with the combination of BTFP, and the Fed nearing the end of the hiking cycle?

- NDX has already gone through a >2 standard deviation move from the post 2008 trend (NDX drew down -33%)
  - Markets are forward looking; recession fears have already been priced in
  - Fed fund futures currently showing a 50% chance of rate cuts by September and 80% by year end

Source: Bloomberg

Have we witnessed the market bottom? (continued)

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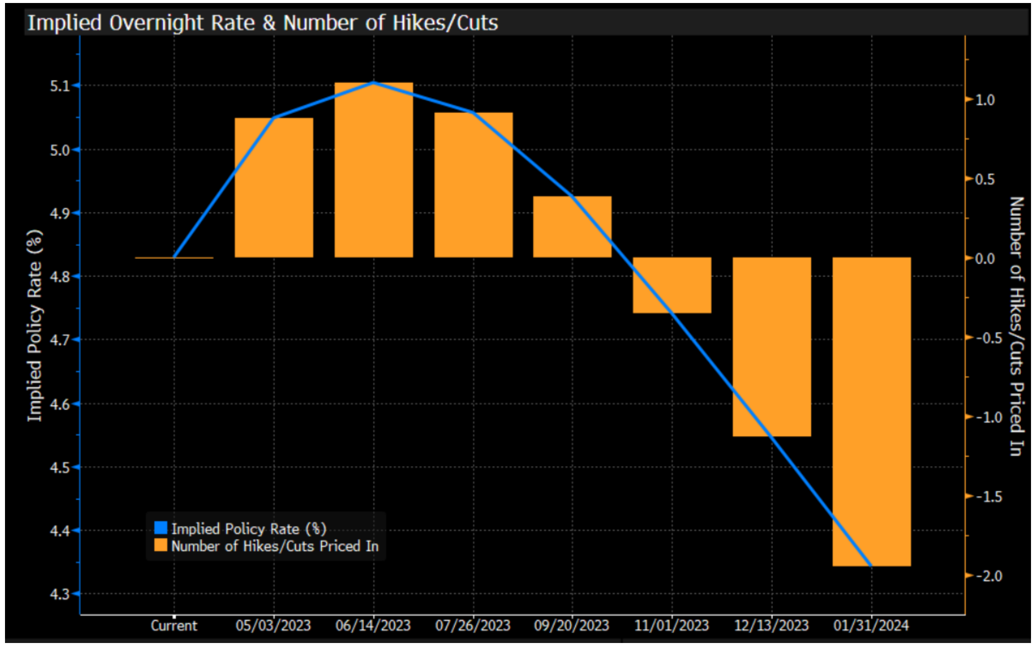
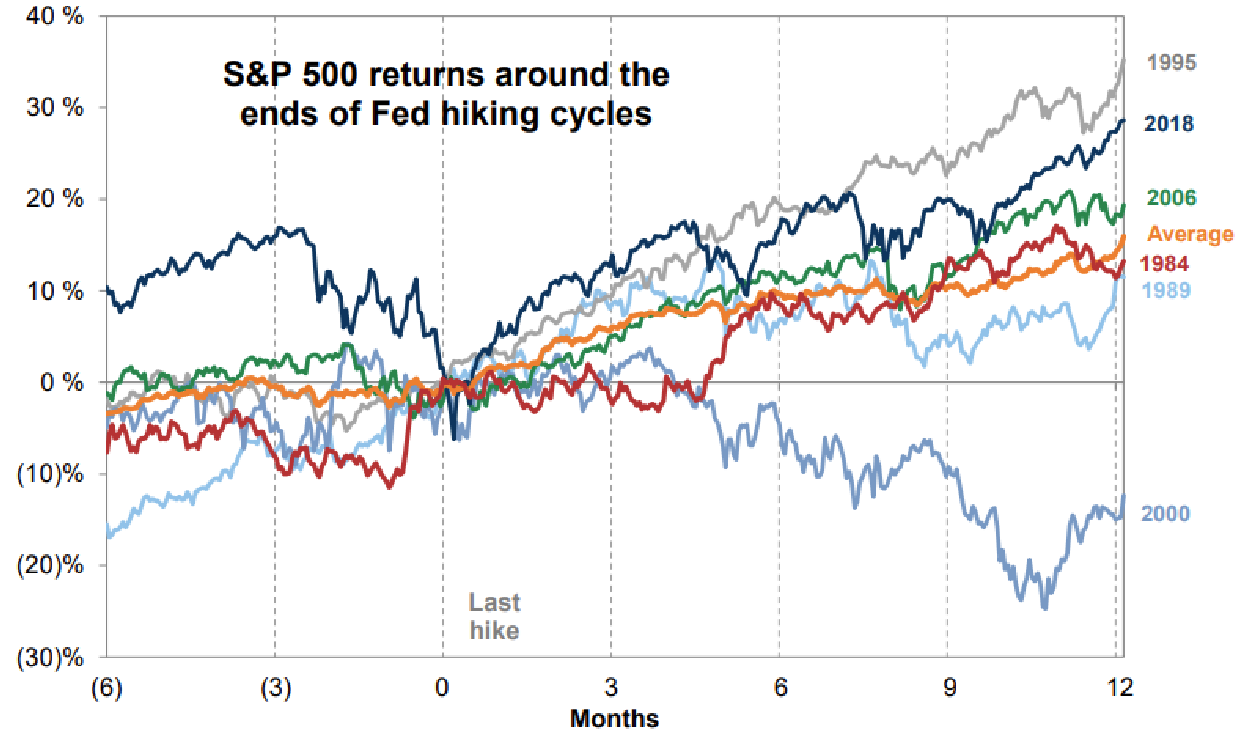
Market Pricing in 1 More Hike in May, Followed by Cuts in Q3/Q4 2023



Returns in the S&P 500 are positive on average following the last Fed hike

Exhibit 2: S&P 500 performance around the end of Fed hiking cycles

as of March 30, 2023



Source: FRB, Goldman Sachs Global Investment Research

An Unstainable Fiscal Path – Treasury Paper

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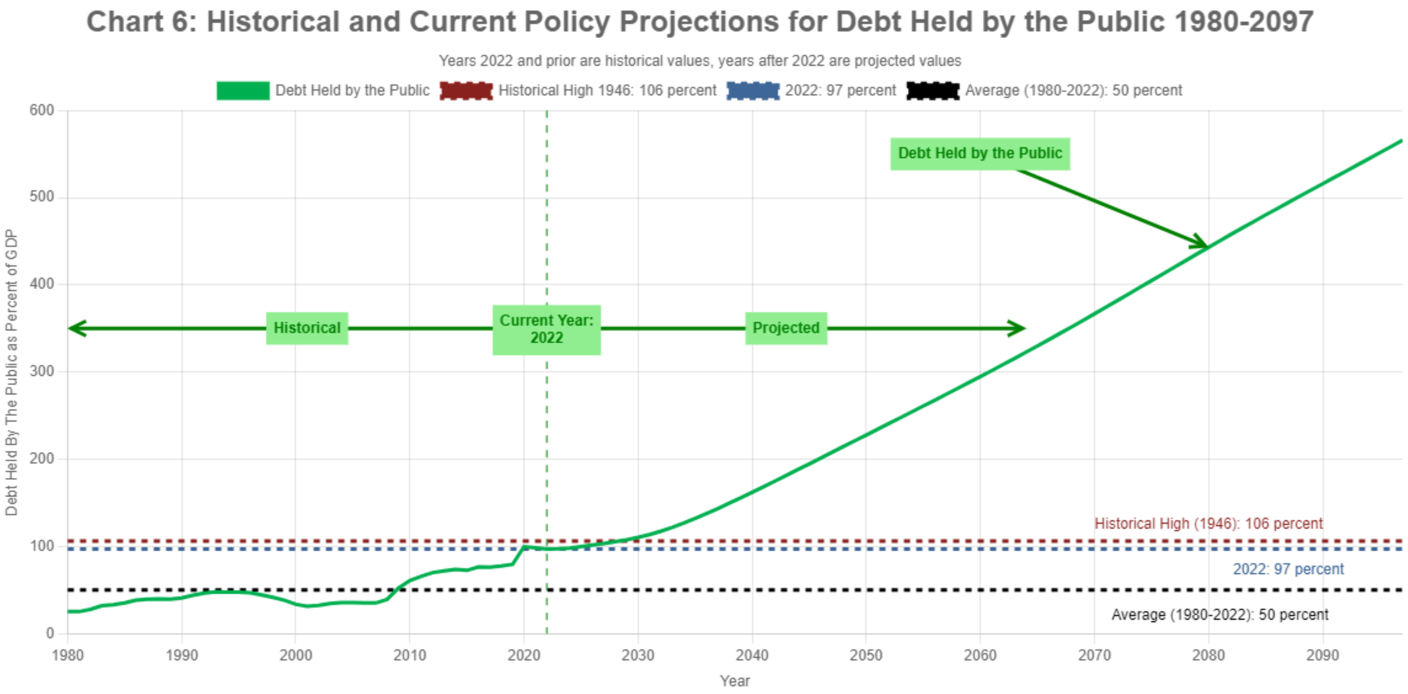
- The current fiscal path is unsustainable – we will need to see productivity increases in order to roll off our debt burden and repair unsustainable spending habits

- The current path debases USD since GDP gains are not commensurate with debt growth; investors have turned to stores of value as a result (gold, silver, bitcoin), as well as secular innovation themes

- Technological improvements will be key to seeing productivity increases necessary to reduce spending and associated debt burden; we are witnessing the "exponential age" of technology beginning to materialize



Source: US Treasury.gov - Financial Report of the United States Government - Executive Summary - An Unsustainable Fiscal Path (treasury.gov)

Appendix

Market Positioning and Sentiment Remains Bearish

- Several indicators point to extreme bearishness in the market
- Hedge Funds are shortest the S&P 500 since 2011

Source: Bloomberg

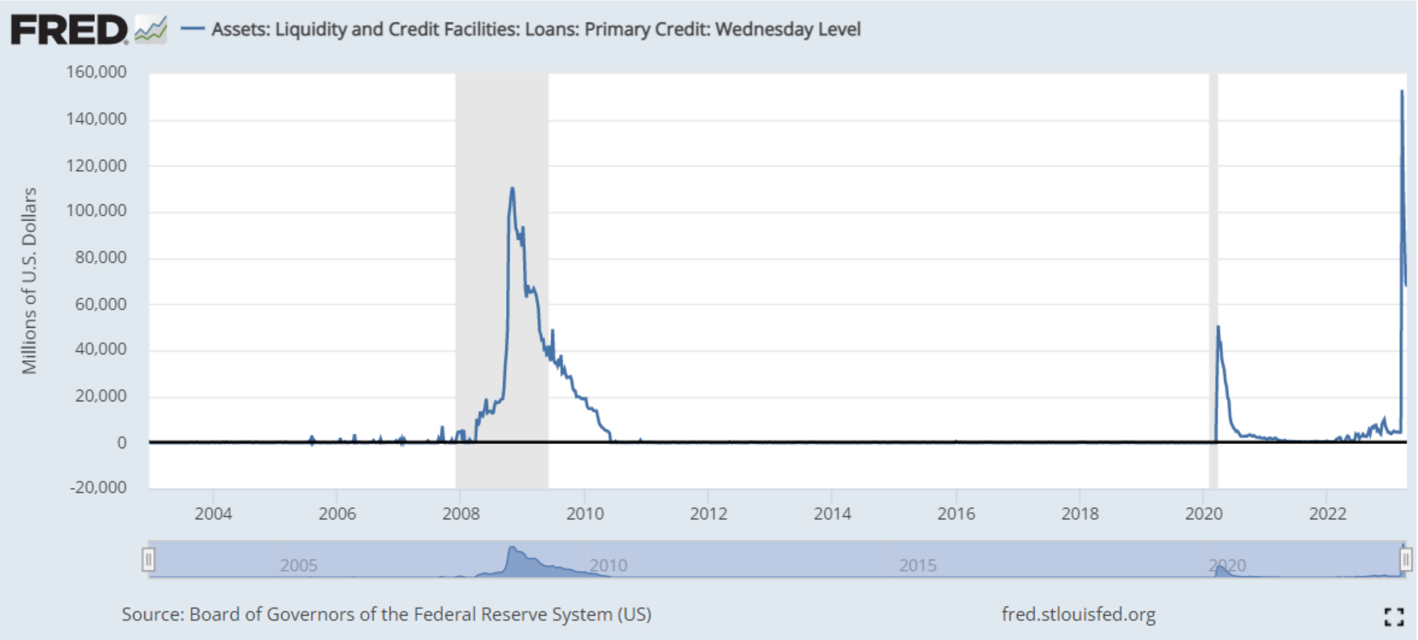
Fed Lending to Banks Eclipsed 2008 Financial Crisis Peak

- The Fed has lent more money to banks in March to shore up balance sheets than it did at the peak of the 2008 financial crises
  - BTFP is only a portion part of it

- Weekly discount window lending during the financial crisis peaked at over $110 billion on Oct. 29, 2008

- This compares with $153 billion in discount window lending in March 2023

  - Spiked by $148 bn from $5bn the week prior to the banking crisis



Source: St. Louis Fed

Market Tends to Rebound Once the Hiking Cycle Completes

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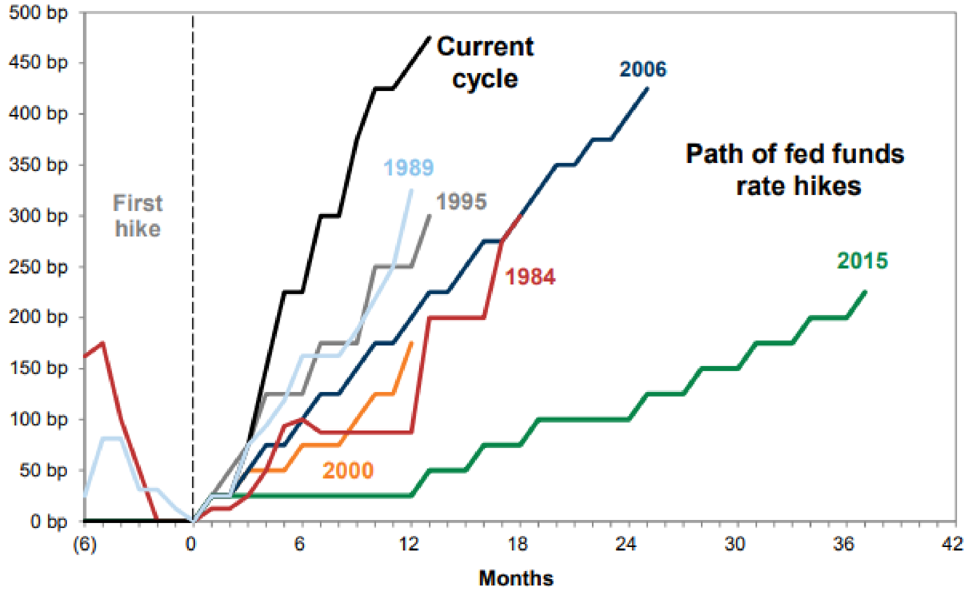
- The current hiking cycle has been the most aggressive in history, which has caused stress to the economy (regional banking crisis and layoffs, among others)
- However, the market tends to perform once the last hike occurs

Exhibit 1: Path of fed funds during previous hiking cycles
as of March 30, 2023



Source: FRB, Goldman Sachs Global Investment Research

Exhibit 2: S&P 500 performance around the end of Fed hiking cycles
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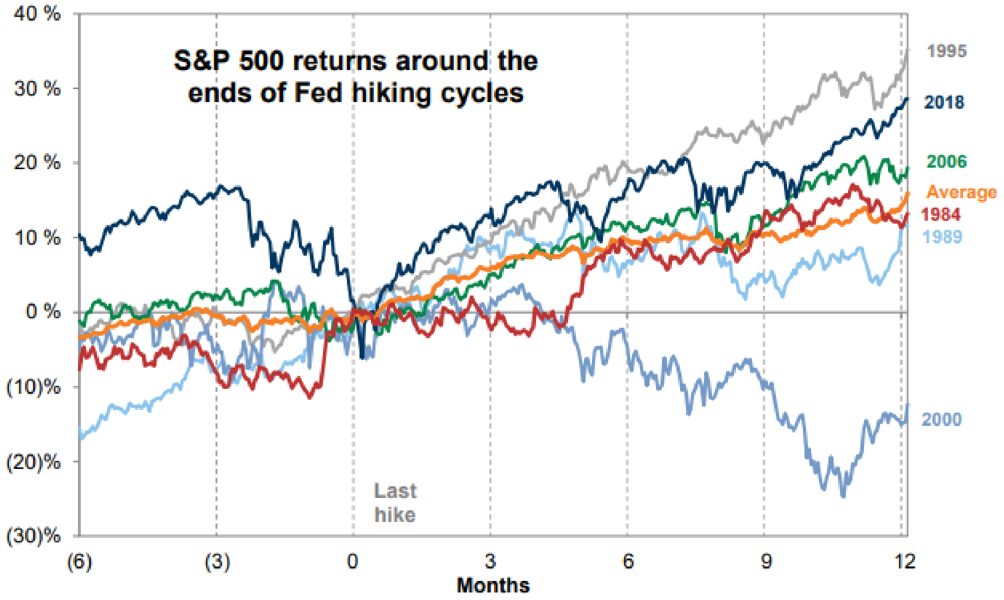

Source: FRB, Goldman Sachs Global Investment Research

Source: FRB, Goldman Sachs Research

US Treasury Debt Outstanding

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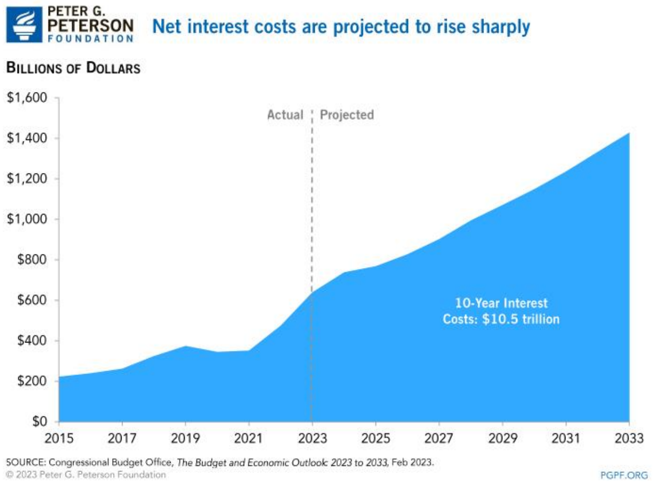
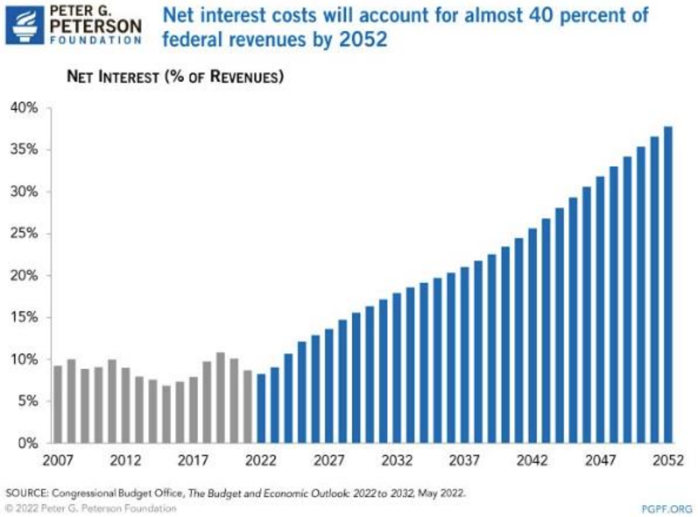
- United States gross debt is >$31 trillion
  - Federal Reserve owns roughly 25% of it
- With higher interest rates, servicing interest payments will become a larger percentage of our spending
  - The US will be borrowing an increasing amount of dollars to service interest payments alone, which is unsustainable
  - 3 drivers of growth in spending: rising healthcare costs per capita, America's aging population, and rapidly escalating interest costs.
  - By 2028 the US will be projected to spend more on interest than defense spending





*Interest payments currently account for ~6.8% of federal spending

Source: Bloomberg; PewResearch; pgpf.org (Peter G. Peterson Foundation)

US Debt to GDP Ratio

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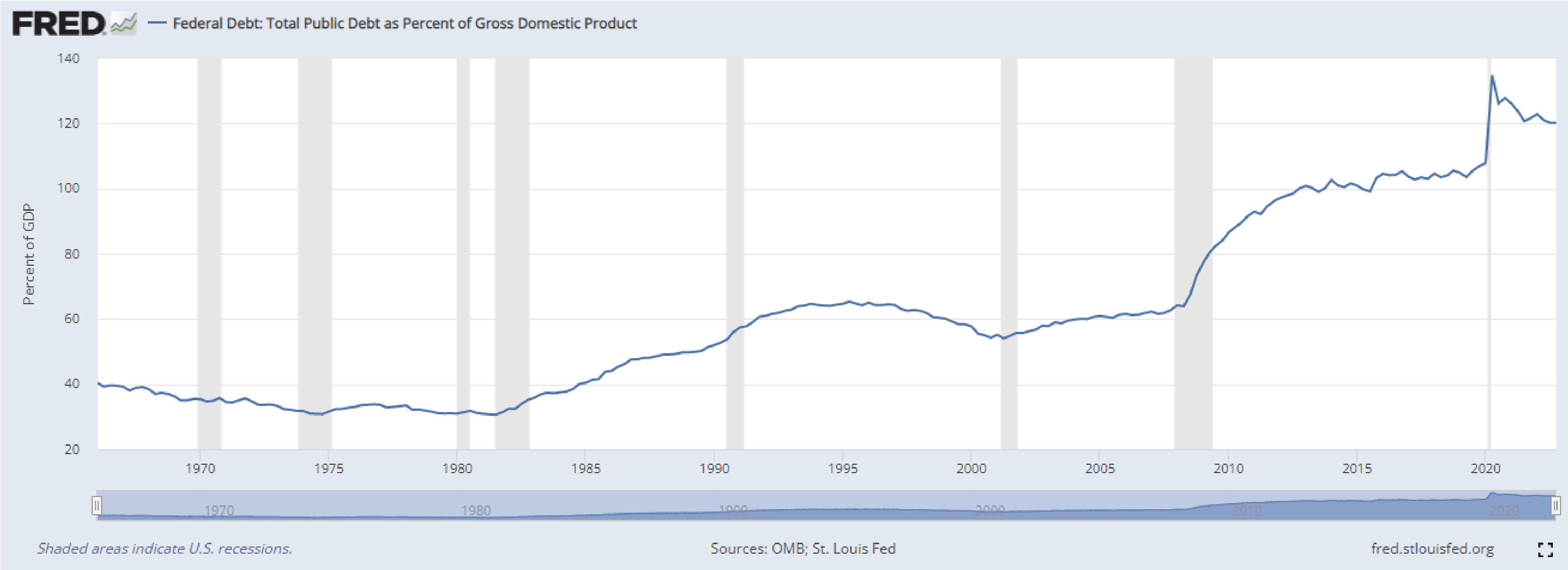
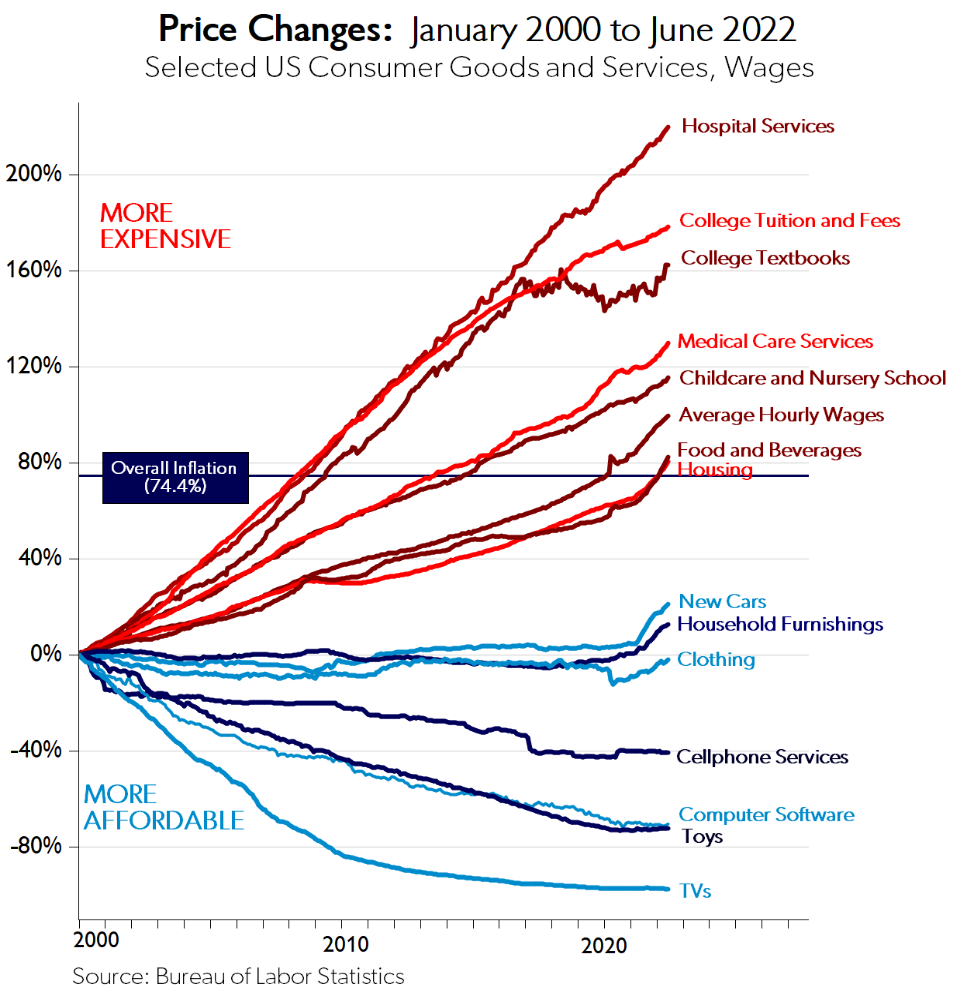
- US Debt to GDP ratio sits at around 120%, down from the COVID highs
- Has trended up since the 1980s; highest since WW2
- GDP is not keeping pace with debt expansion



Source: fred.stlouisfed.org

Inflation by Type of Good or Service since 2000

- U.S. consumers have seen a divergence of price movements across various categories that traditional CPI doesn't capture
- These trends started pre-QE cycle and continue to present day
- Debt expansion + demand + supply scarcity has driven inflation in these categories
- Technological advancements have driven deflation in consumer goods
- The hourly wages metric is deceiving – household income is a better measure, and has not kept up with housing prices, college tuition, and medical costs
- Real wages (adjusted using traditional CPI) have barely budged since the 1970s



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