

The Changing Macroeconomics of Metals Markets

April 2025

Erik Norland

Chief Economist

Investment Advice is Neither Given Nor Intended

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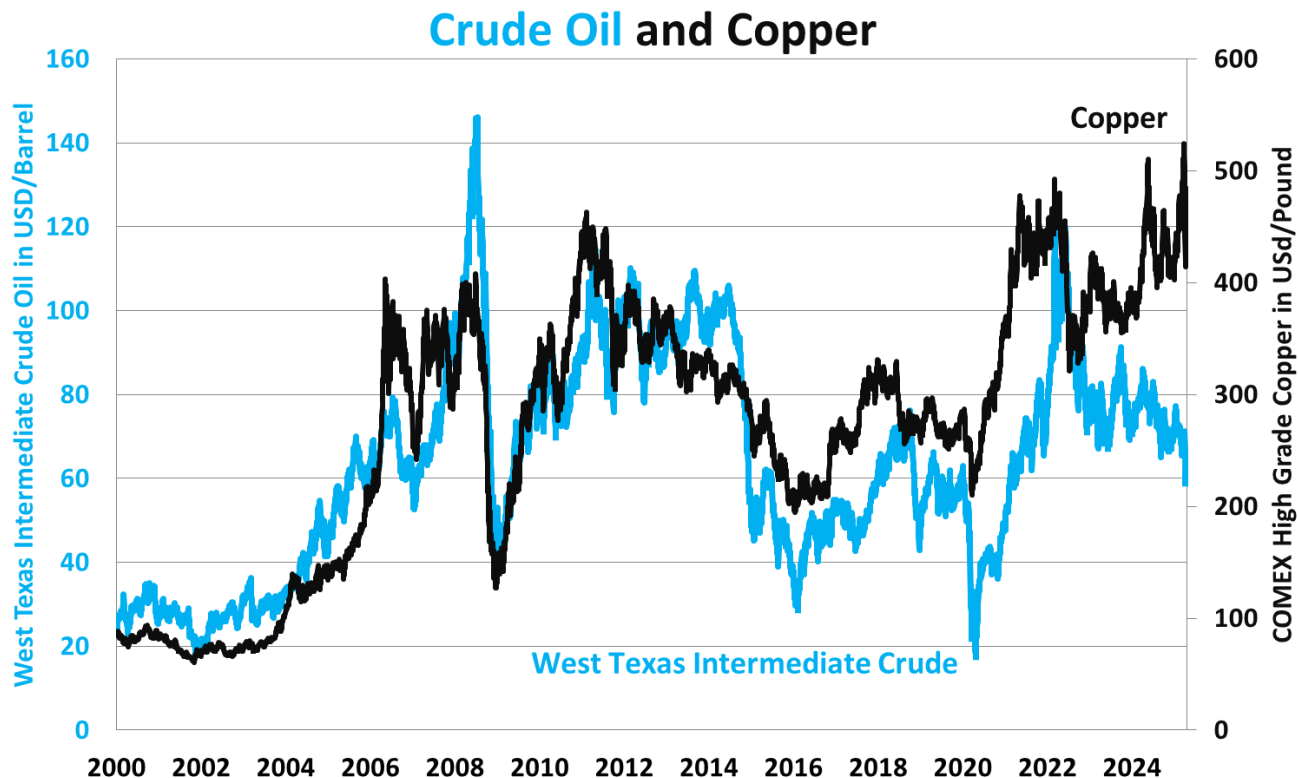
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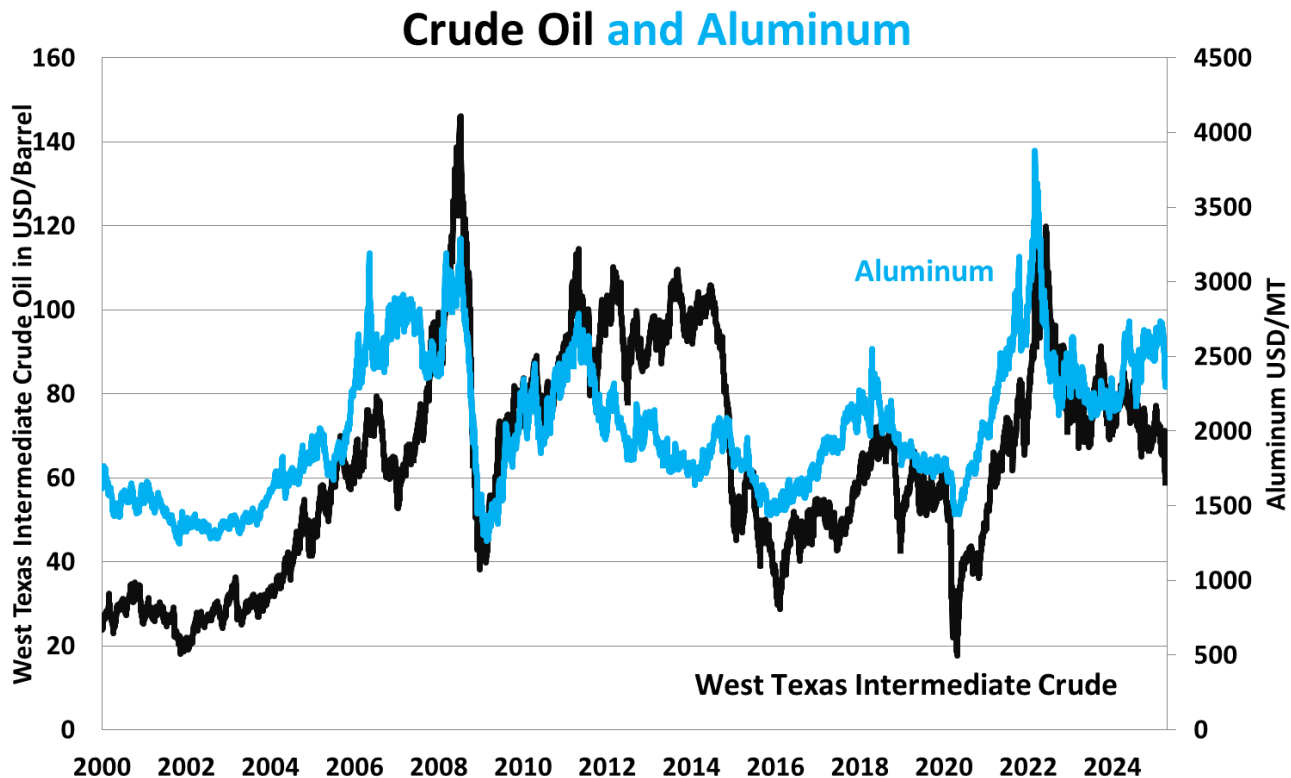
Copper Is Diverging from Aluminum, China and Oil.

Since Late 2022, Copper Has Diverged From Crude Oil



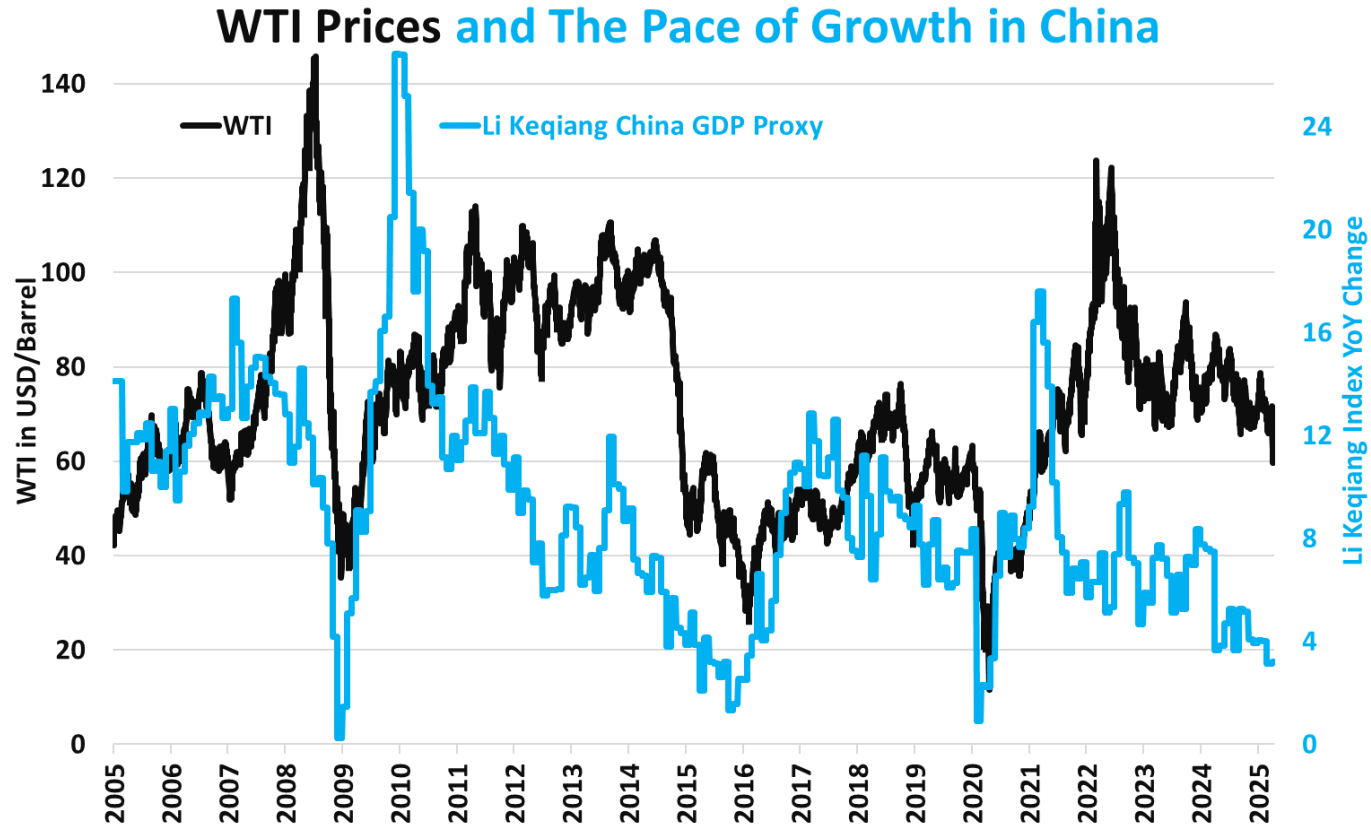
Source: Bloomberg Professional ([CL1](#) and [HG1](#))

Aluminum Has Hewed Closer to Oil Prices Than Copper



Source: Bloomberg Professional (CL1 and ALE1, LA1 Pre-2021)

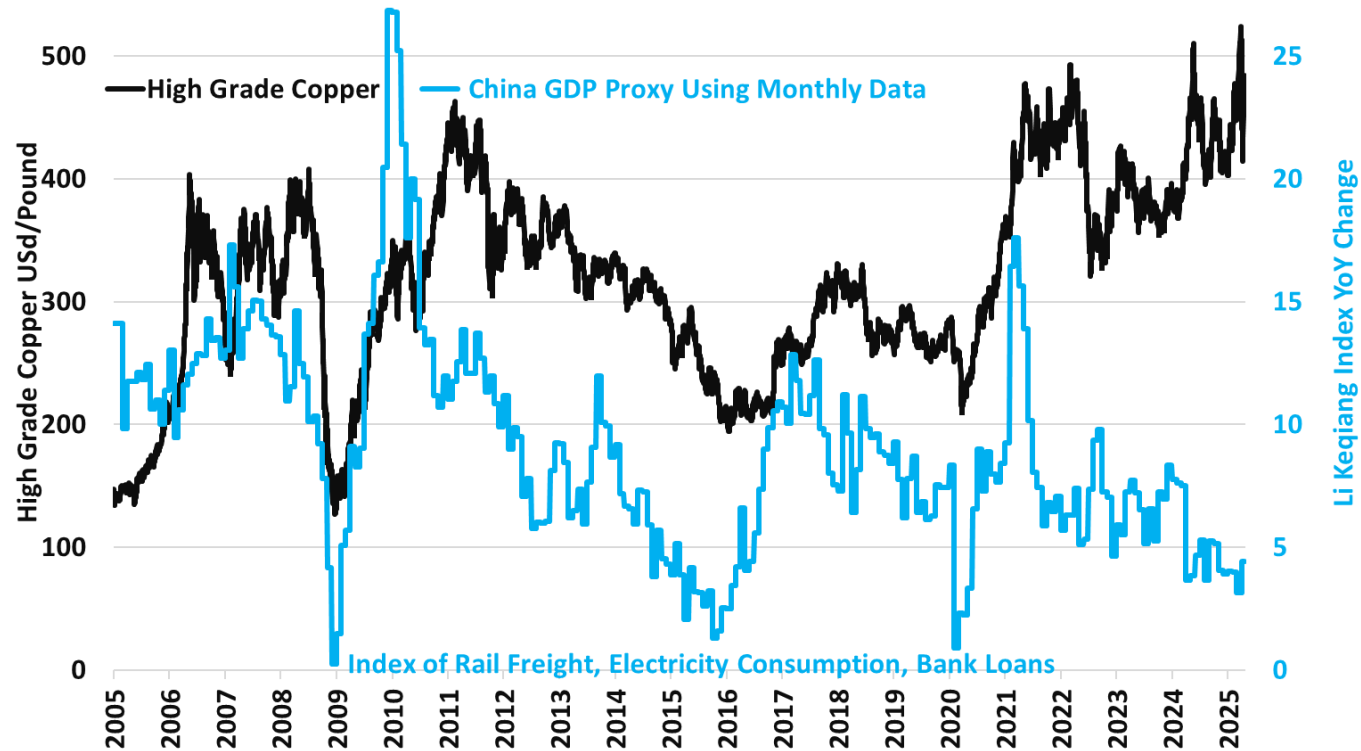
Crude Oil Prices Follow Chinese Growth With a One Year Lag.



Source: Bloomberg Professional (USCRWTIC and [CLKQINDX](#))

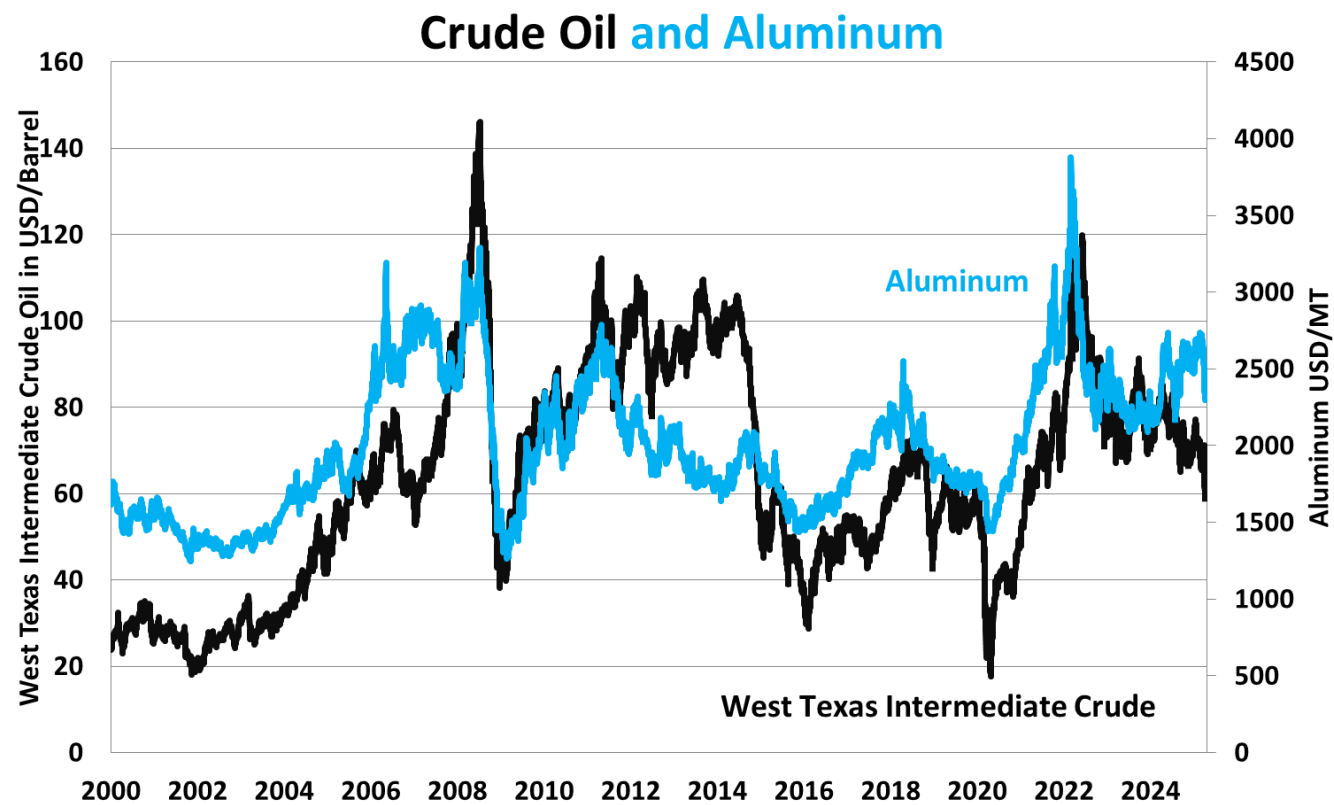
Copper Prices Have Diverged From Chinese Growth As Well.

Copper and The Pace of Growth in China



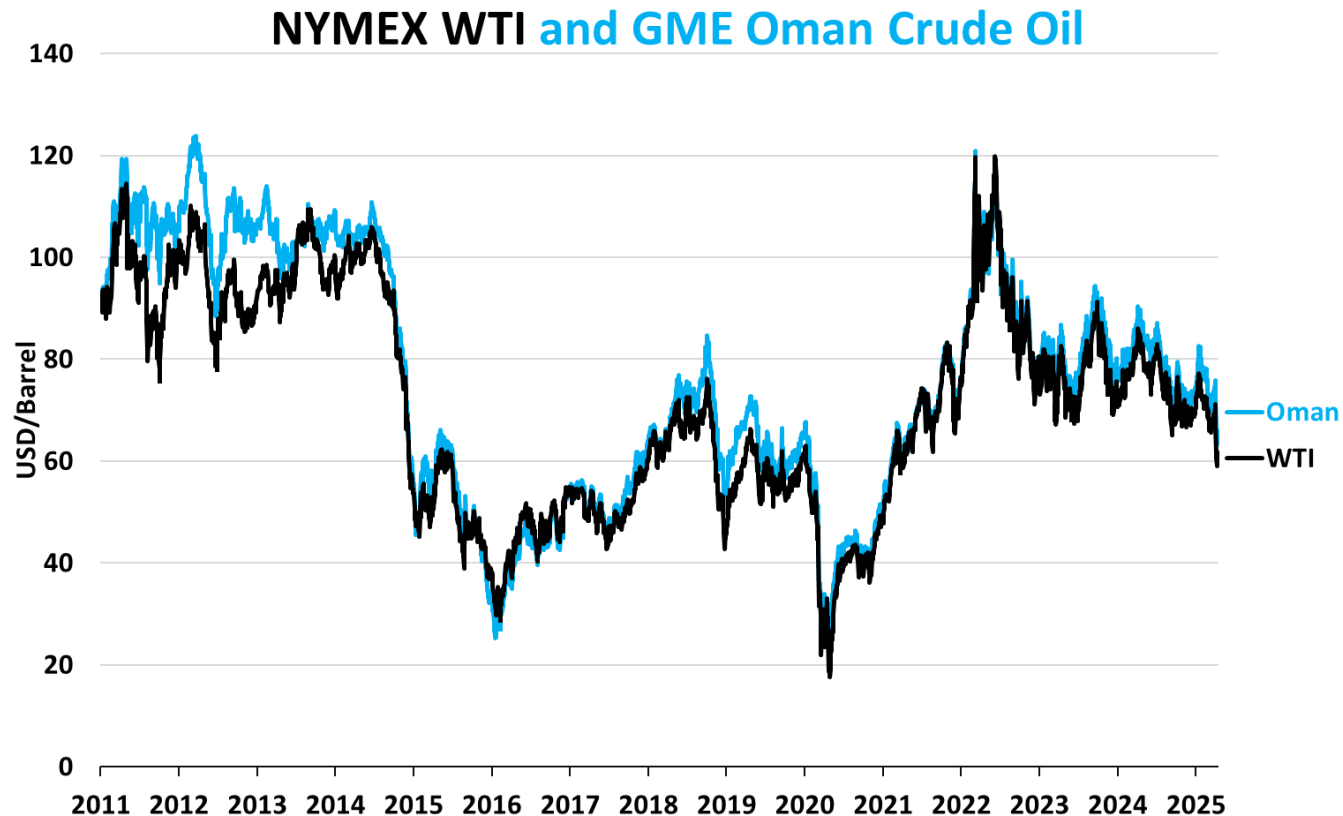
Source: Bloomberg Professional (HG1 and [CHTPTR1Y](#), [CZINELEC](#) and [CNLNTTLY](#))

Aluminum Prices Have Diverged From Chinese Growth As Well.



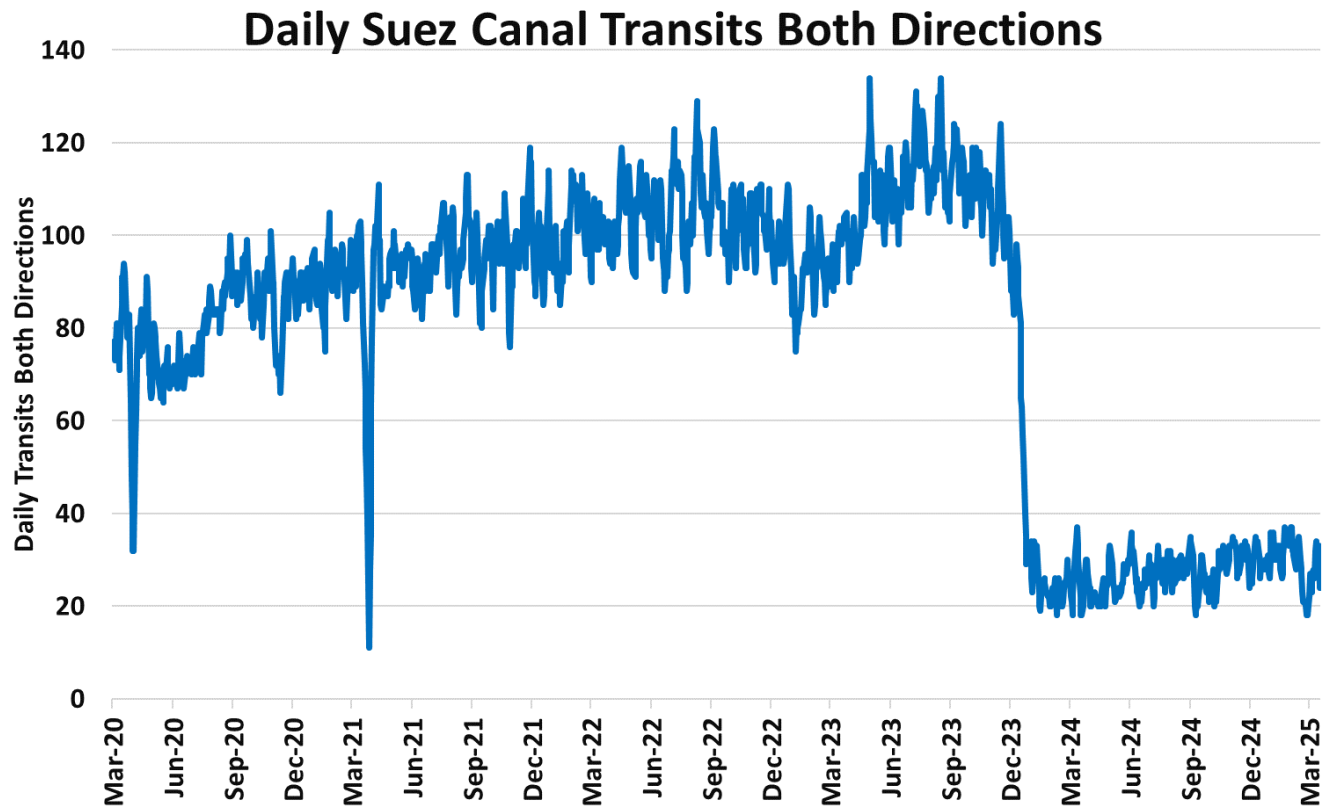
Source: Bloomberg Professional (CL1 and ALE1, LA1 Pre-2021)

Crude Oil Prices Have Broken Down Through Support



Source: Bloomberg Professional ([OQA2](#) and [CL2](#))

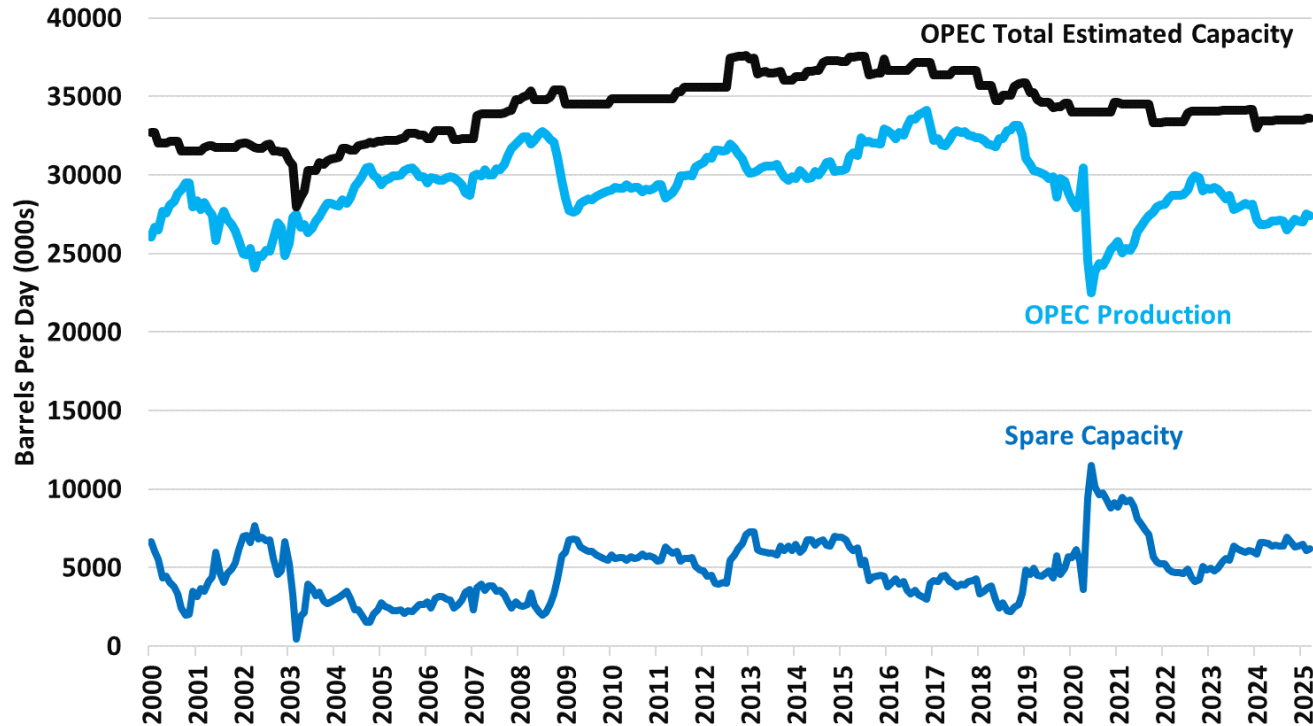
Traffic Through the Suez Canal and the Red Sea has Fallen by 85%.



Source: Bloomberg Professional (TRSSCTCT + TRNSCTCT)

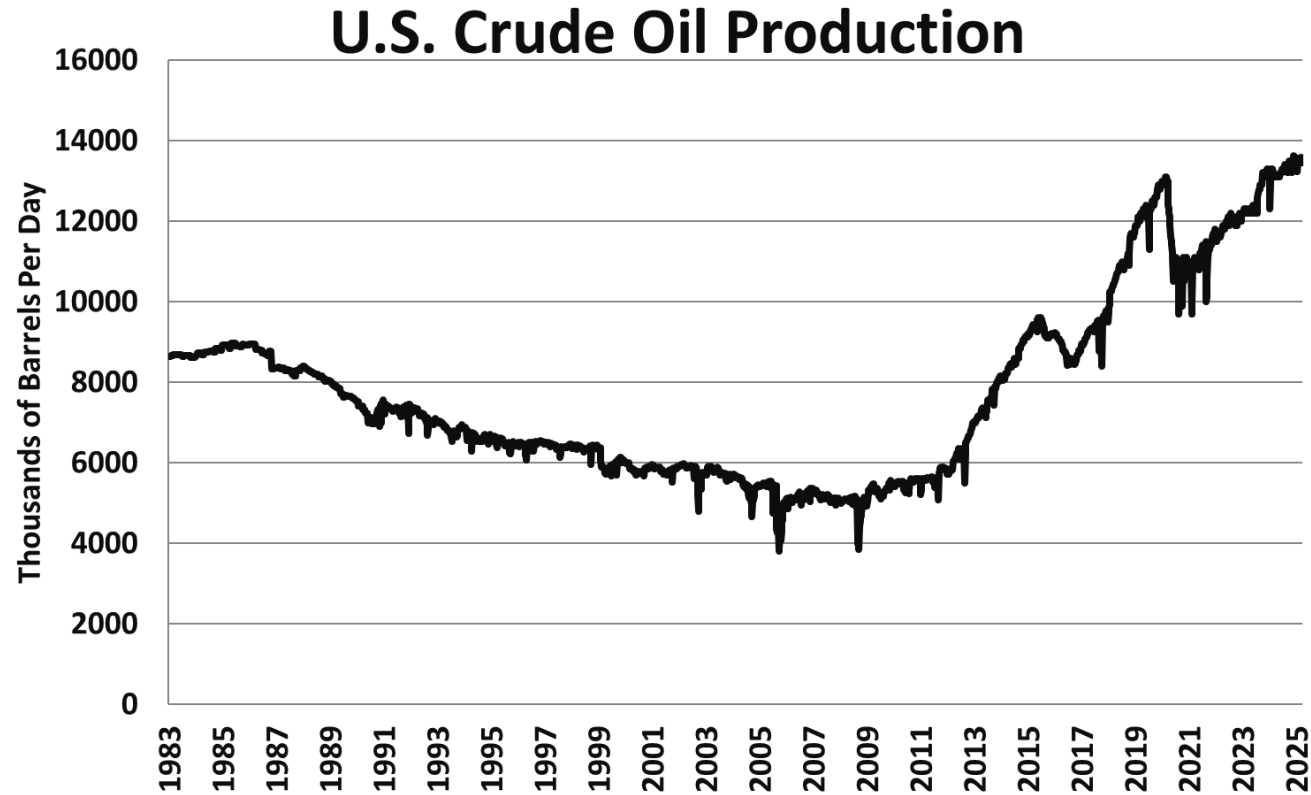
OPEC Has Been Cutting Back on Production Since Q4 2022.

OPEC: Total Estimated Capacity and Production



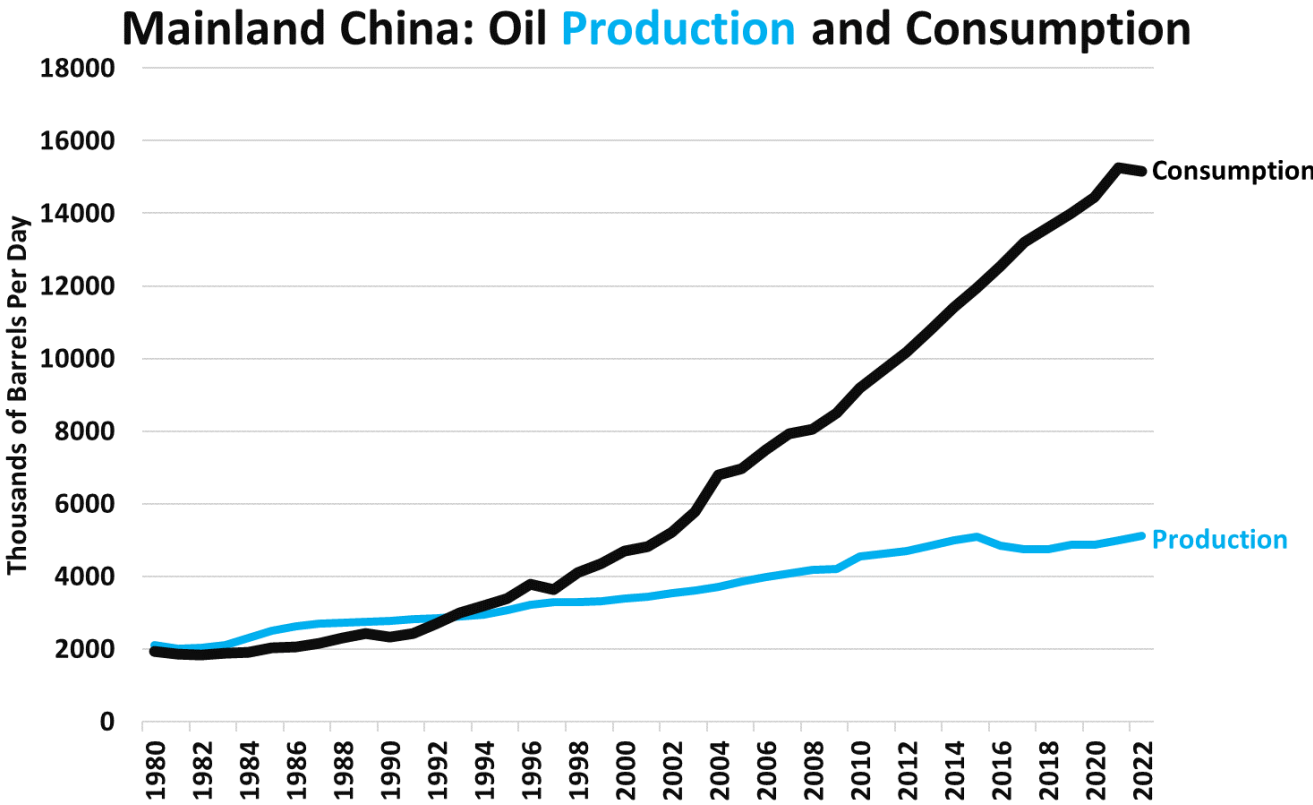
Source: Bloomberg Professional (OPCRECTO and OPCRTOTL), CME Economic Research Calculations

U.S. Crude Production Is At Record Highs.



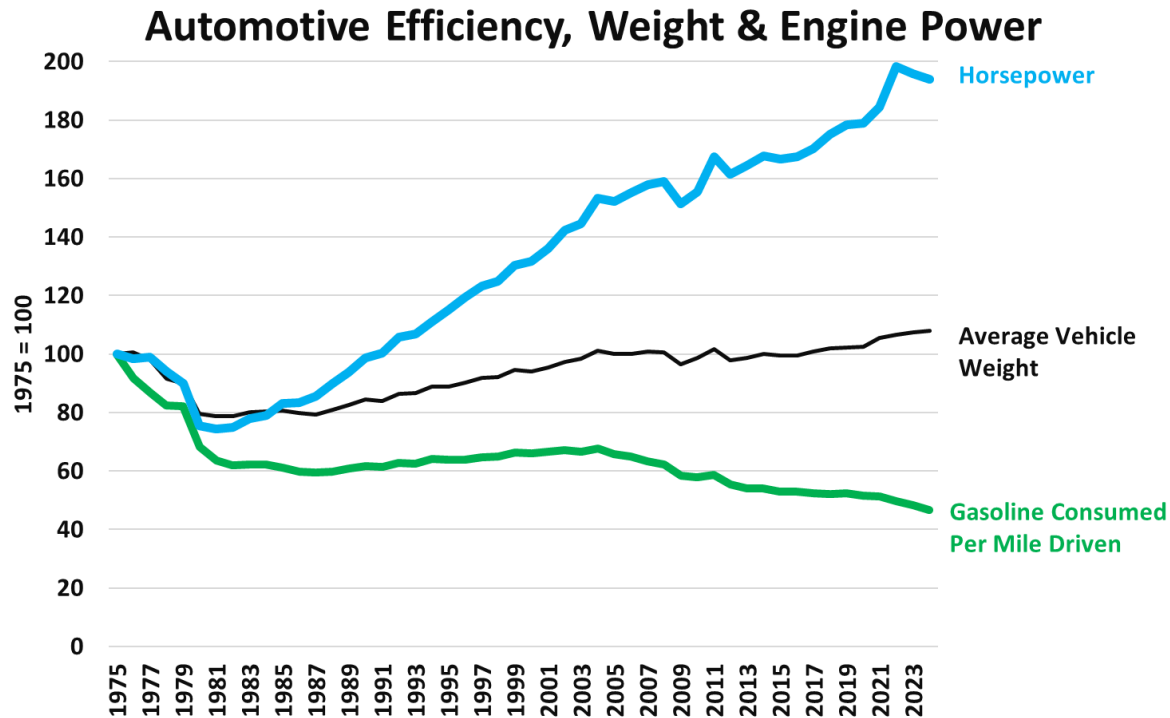
Source: Bloomberg Professional, EIA (DOETCRUD)

China is the World's Main Importer of Oil



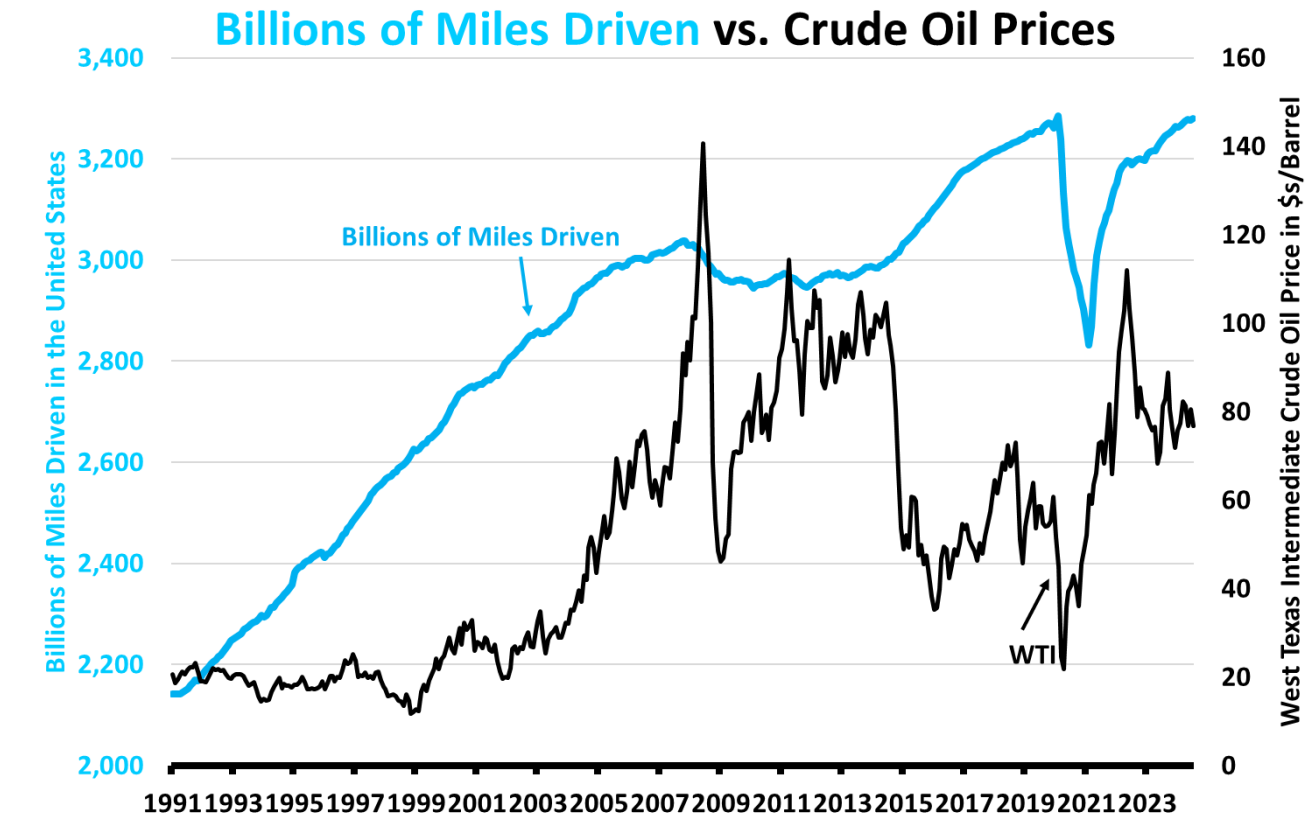
Source: Energy Information Administration, International Data, Petroleum and Other Liquids

The Average Car Uses Less Than ½ As Much Fuel As 50 Years Ago. And They Become 3% More Efficient Each Year.



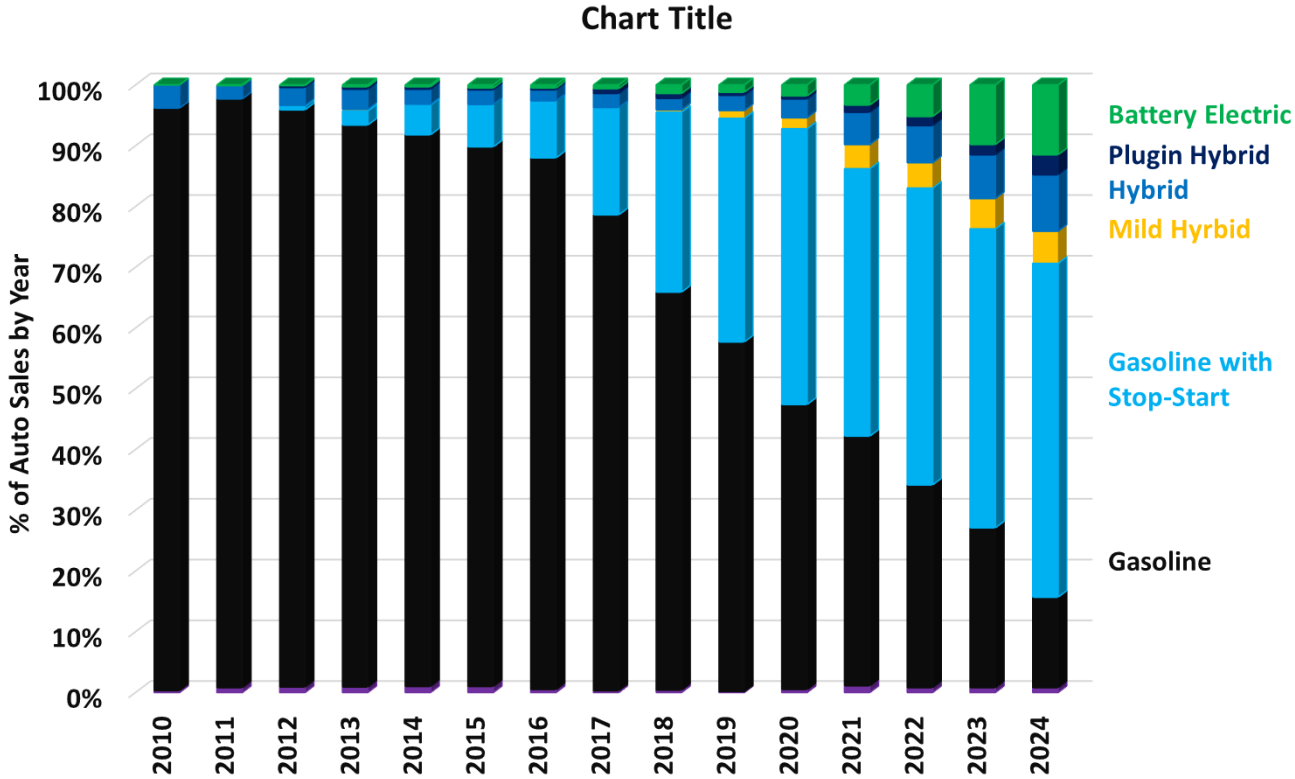
Source: EPA Automotive Trends Database 2024

And People Aren't Driving Any More Now Than in 2019.



Source: [Federal Highway Administration, February 2024 Traffic Volume Trends](#), Bloomberg Professional (Code: USCRWTIC)

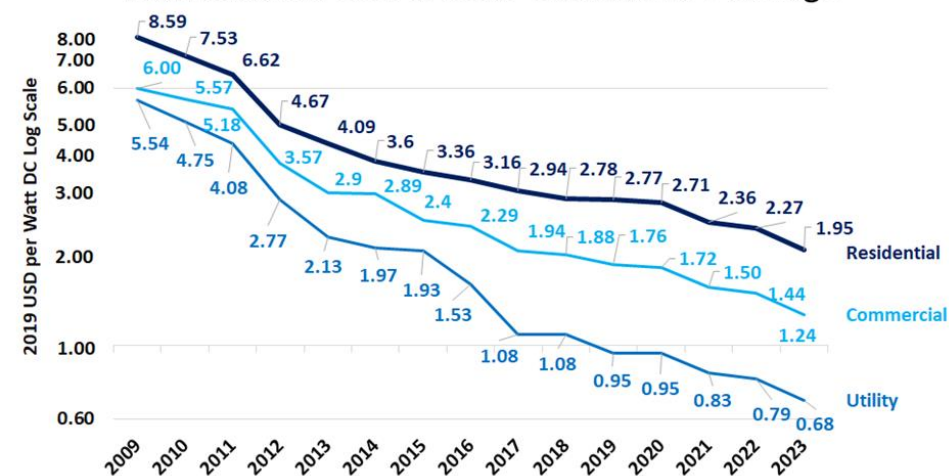
Automotive Technology Is Changing Rapidly.



Source: EPA Automotive Trends 2024, <https://www.epa.gov/greenvehicles/50-years-epas-automotive-trends-report>

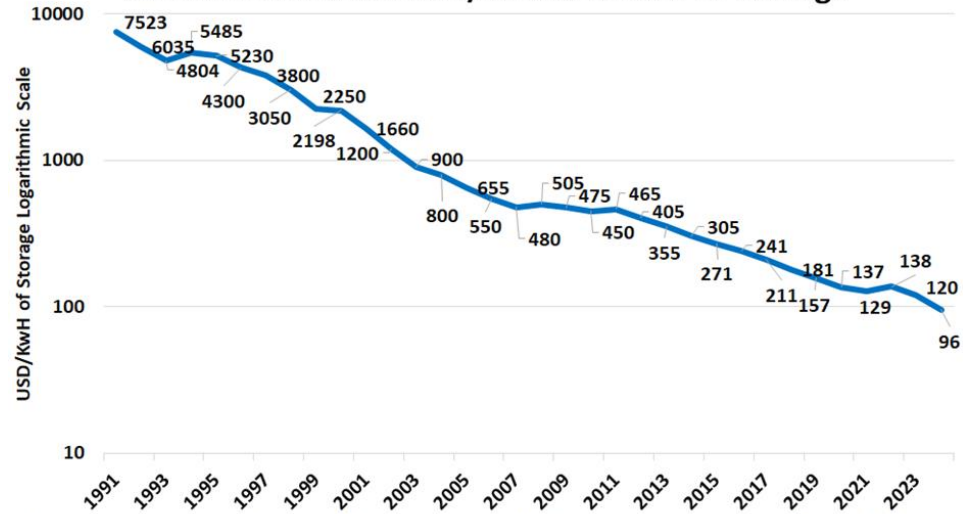
Solar Panel and Lithium-ion Battery Costs Continue to Come Down.

Total Installed Cost of Solar Generation + Storage



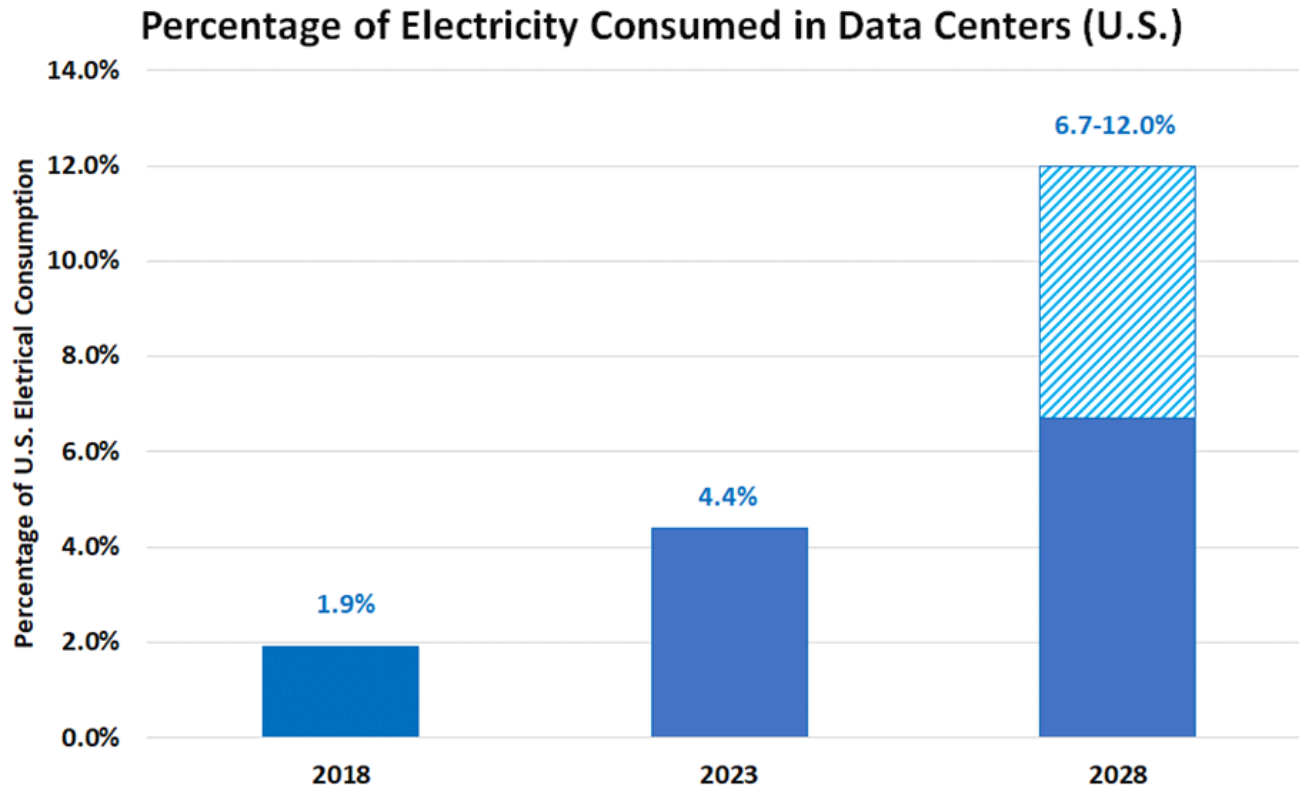
Source: <https://www.nrel.gov/news/program/2021/documenting-a-decade-of-cost-declines-for-pv-systems.html>
 Updated from 2021-2023 with Statista, "Average Installed cost for solar photovoltaics worldwide."
<https://www.statista.com/statistics/809796/global-solar-power-installation-cost-per-kilowatt/>

Lithium Batteries: USD/kilowatt hour of storage



Source: <https://arstechnica.com/science/2020/12/battery-prices-have-fallen-88-percent-over-the-last-decade/>, Bloomberg NEF,
<https://ourworldindata.org/battery-price-decline>, <https://www.statista.com/statistics/883118/global-lithium-ion-battery-pack-costs/>

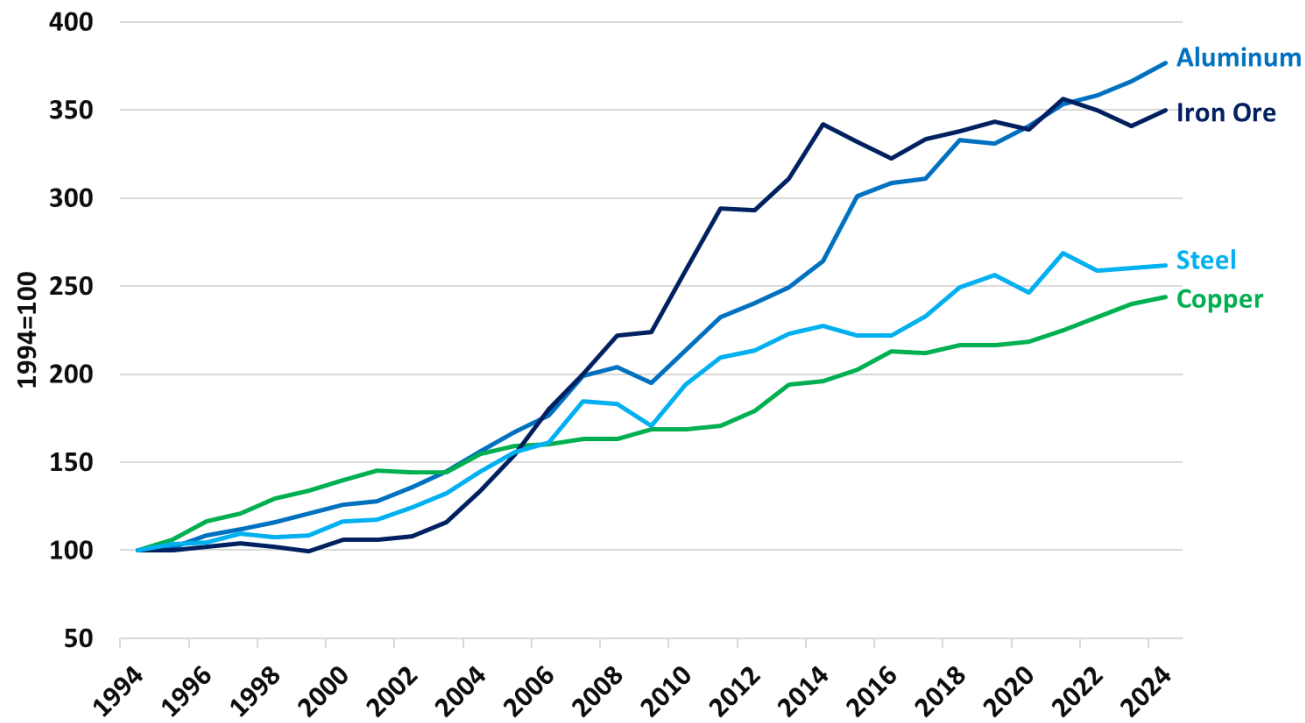
Generative AI Is Leading to a Sharp Rise in Electrical Demand



Source: <https://www.energy.gov/articles/doe-releases-new-report-evaluating-increase-electricity-demand-data-centers#:~:text=The%20report%20finds%20that%20data,total%20U.S.%20electricity%20by%202028.>

Copper Mining Supply Has Been Growing Slowly.

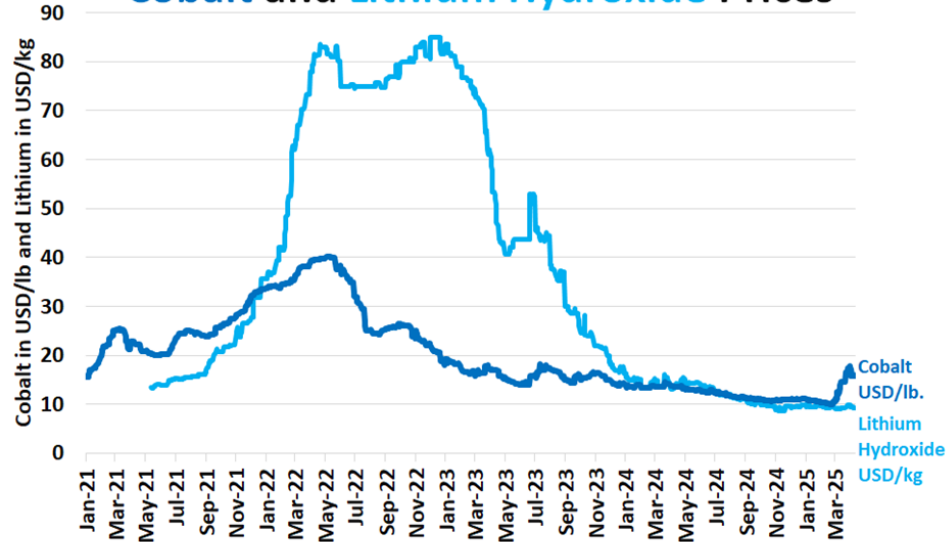
Global Production Change Since 1994



Source: US Geological Survey, National Minerals Information Center, Mineral Commodity Summaries 1994-2024

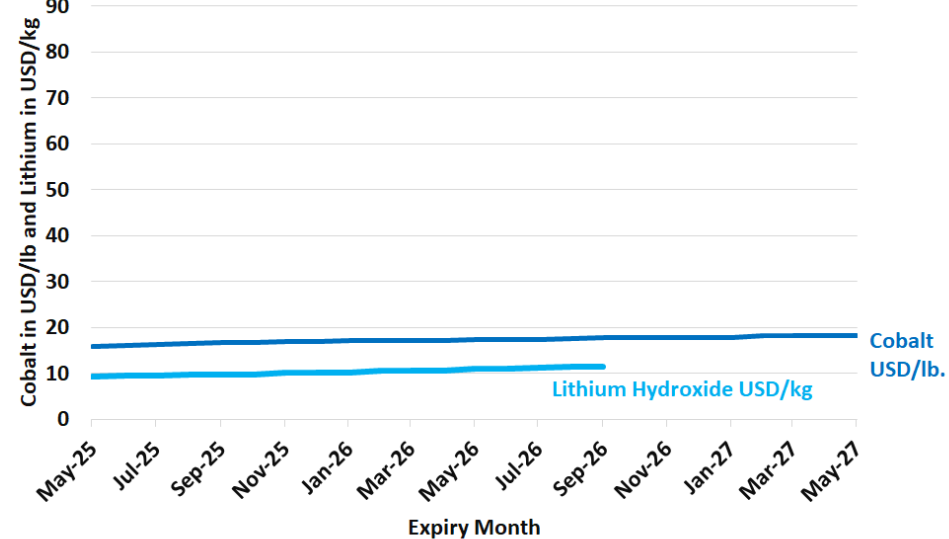
Lithium and Cobalt Prices Have Been Falling Until Recently

Cobalt and Lithium Hydroxide Prices



Source: Bloomberg (CVT1 and LFA1)

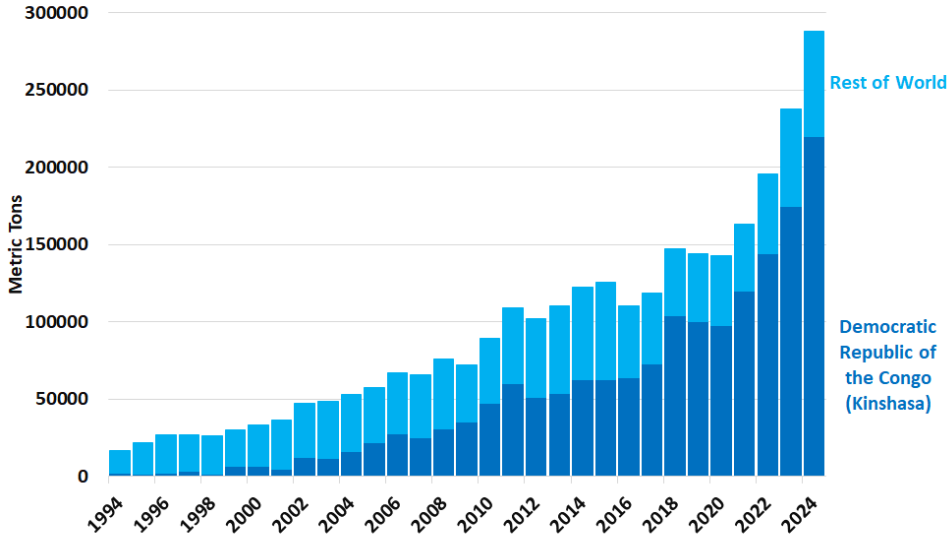
Cobalt and Lithium Futures Curves: April 14, 2025



Source: Bloomberg (CVT1 ... CVT26 and LFA1 ... LFA 16)

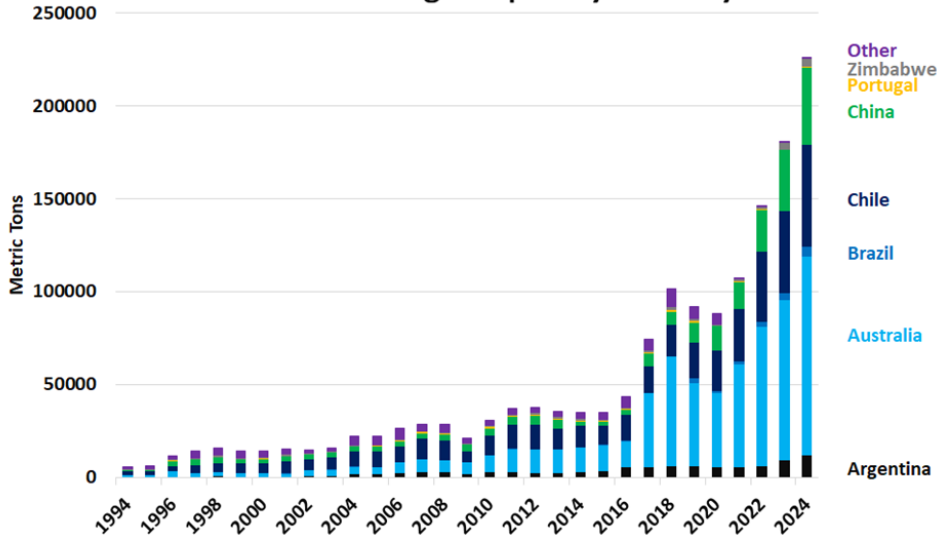
Copper Mining Supply Has Been Growing Slowly.

Cobalt: Mine Production



Source: U.S. Geological Survey, Cobalt Statistics and Information, Annual Publications 1994-2025

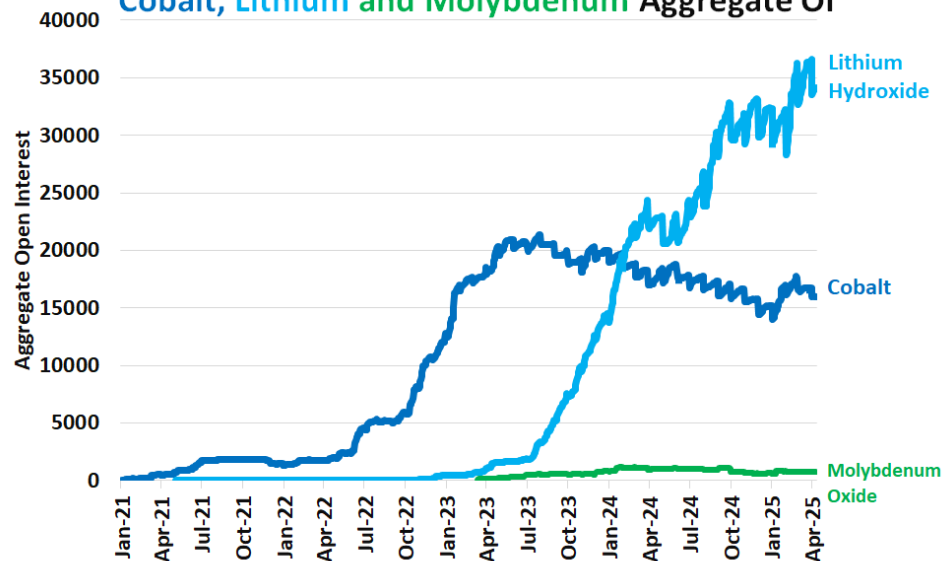
Lithium: Mining Output by Country



Source: U.S. Geological Survey, Lithium Statistics and Information, Annual Publications 2005-2023, 2024 estimate from: <https://www.reuters.com/markets/commodities/lithium-supply-surplus-set-stay-with-battery-makers-help-2024-12-10/>

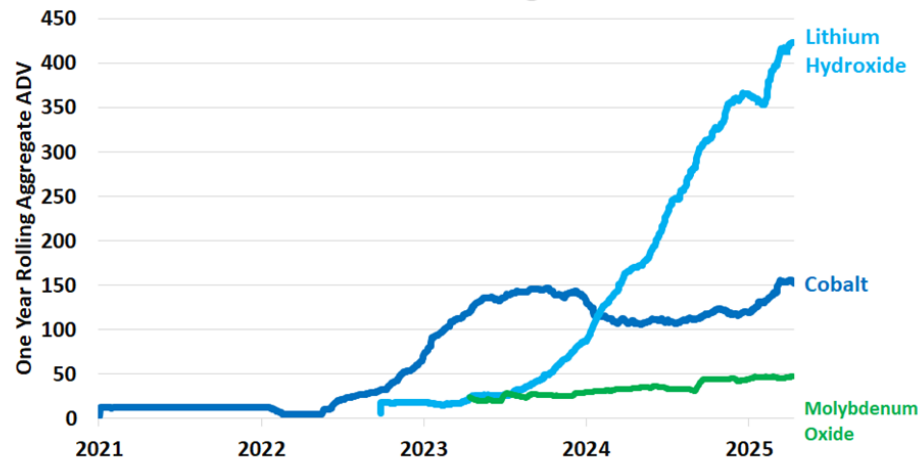
Trading Activity In Lithium and Cobalt Has Been on the Rise.

Cobalt, Lithium and Molybdenum Aggregate OI



Source: Bloomberg (CVT1 and LFA1)

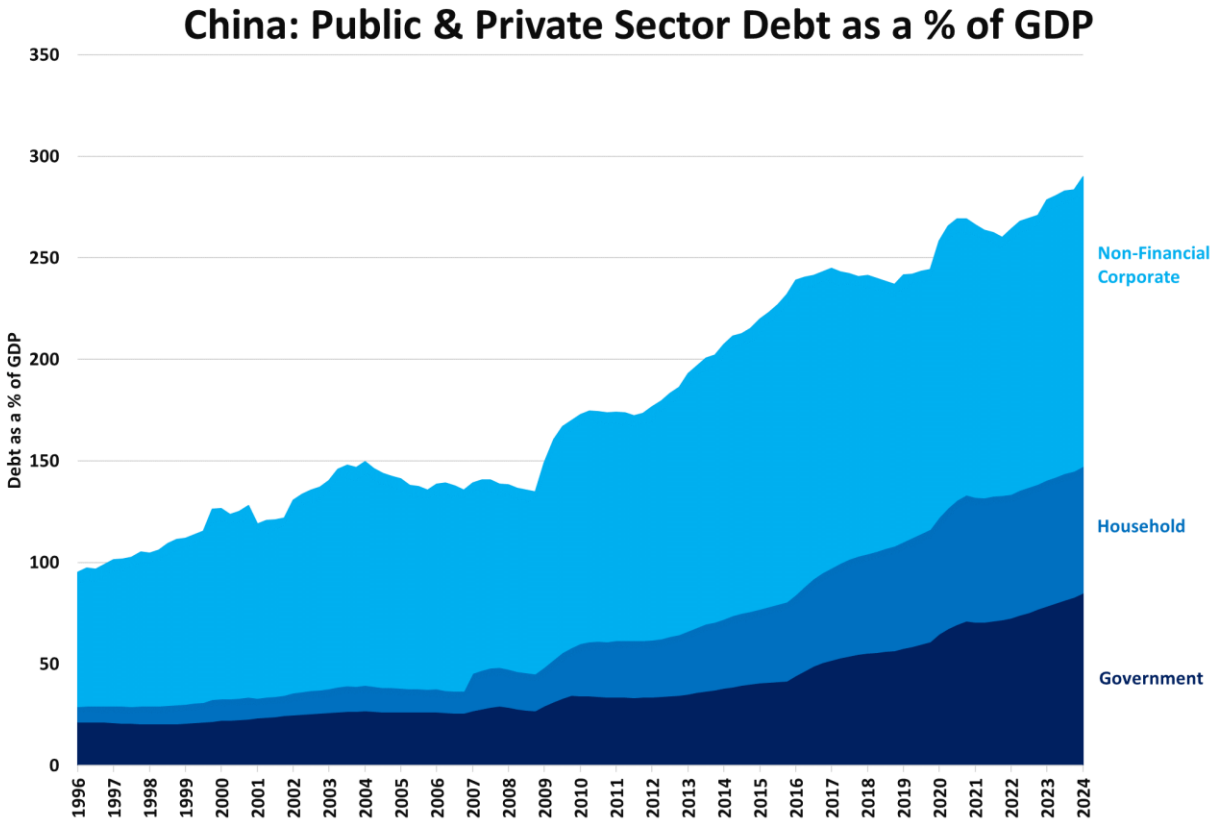
Cobalt, Lithium and Molybdenum Oxide One Year Rolling Aggregate ADV



Source: Bloomberg (CVT1 and LFA1)

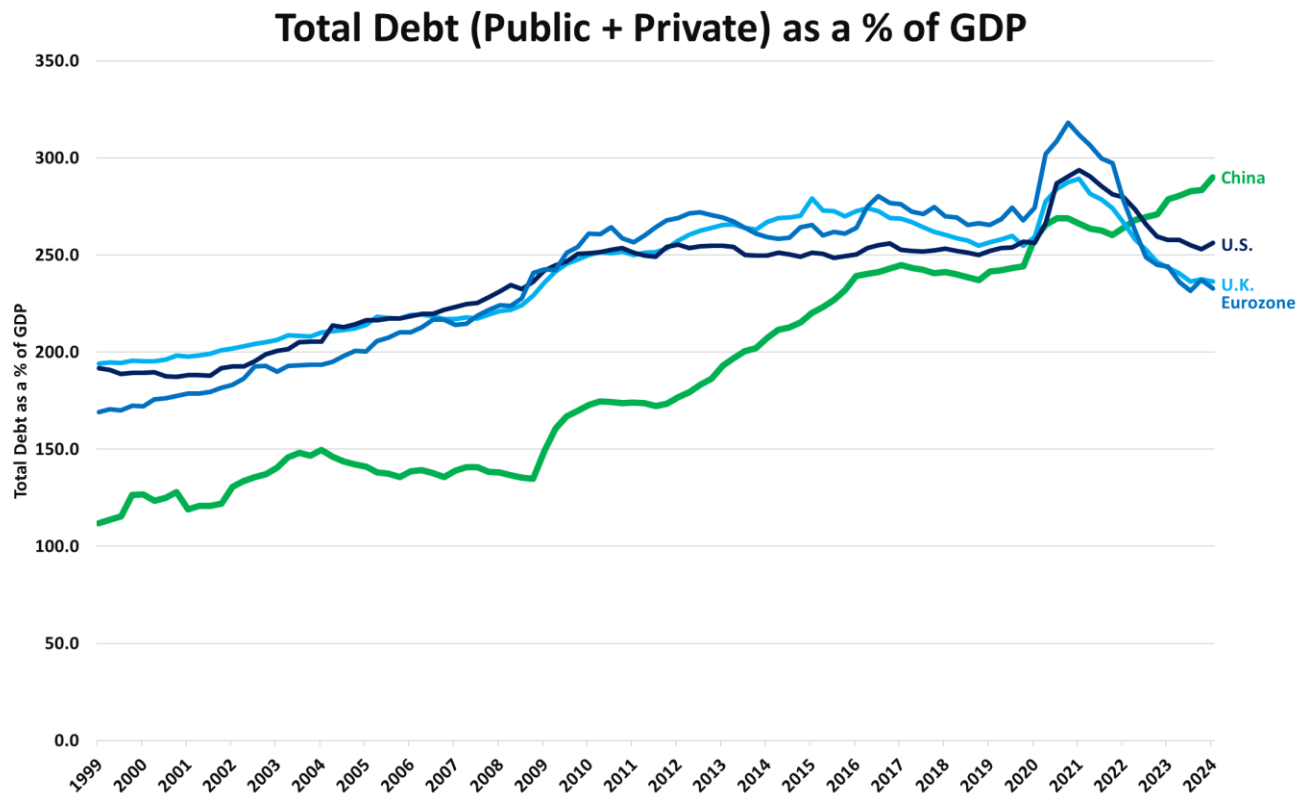
What's Happening in China?

China's Debt Levels Have Soared Since 2008.



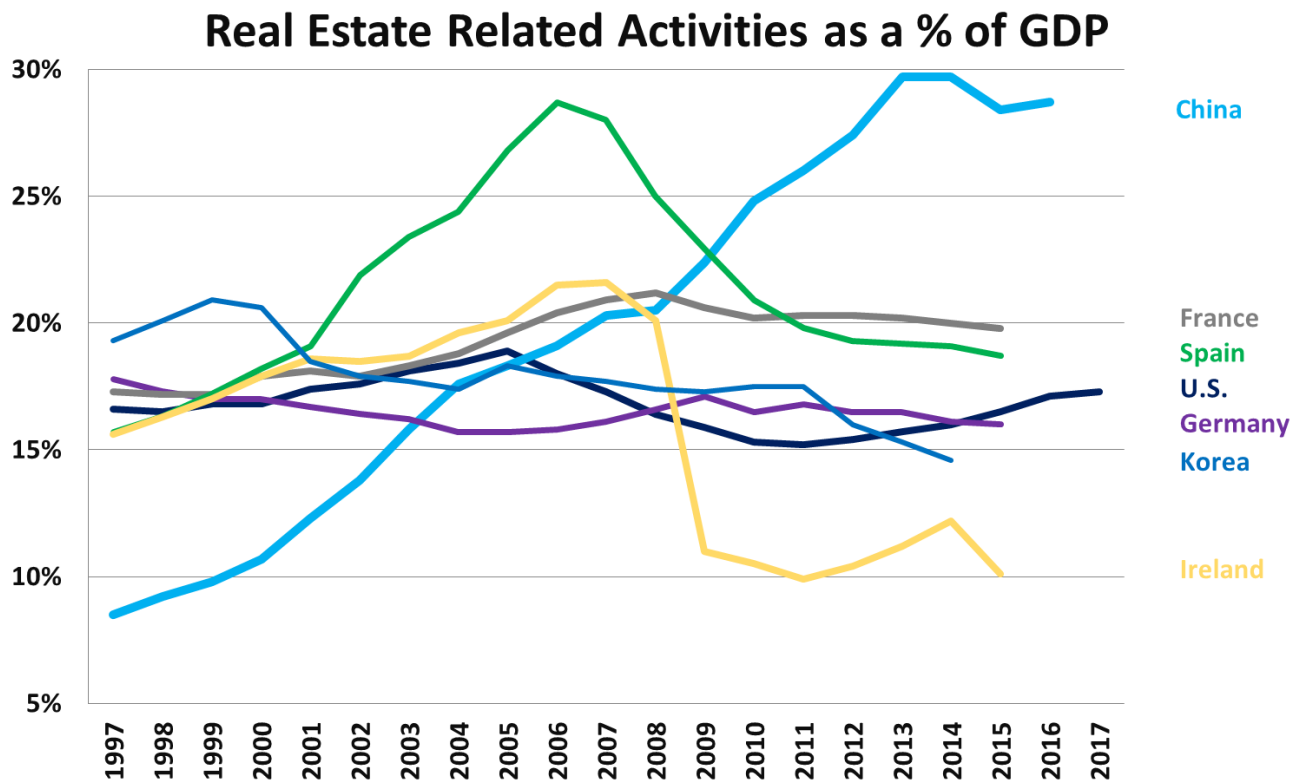
Source: Bank for International Settlements, Total Credit to the Non-Financial Sector Database (Q:CN:H:A:M:770:A, Q:CN:N:A:M:770:A, Q:CN:N:A:M:770:A)

China's Debt Levels Now Exceed the U.S. and Europe's



Source: Bank for International Settlements, Total Credit to the Non-Financial Sector Database

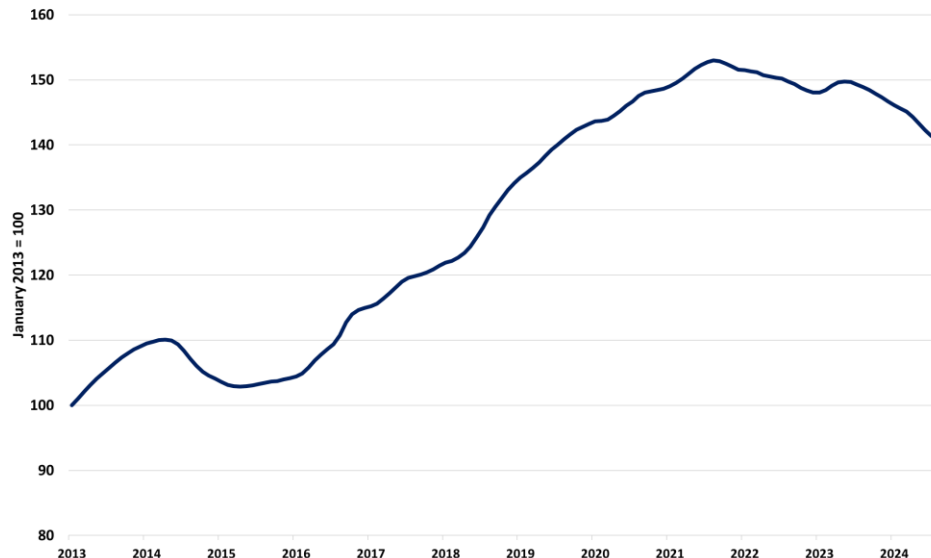
China's Debt Boom Fuelled a Massive Real Estate Bubble



Source: Rogoff and Yang, "China and the World Economy", Harvard University 2021

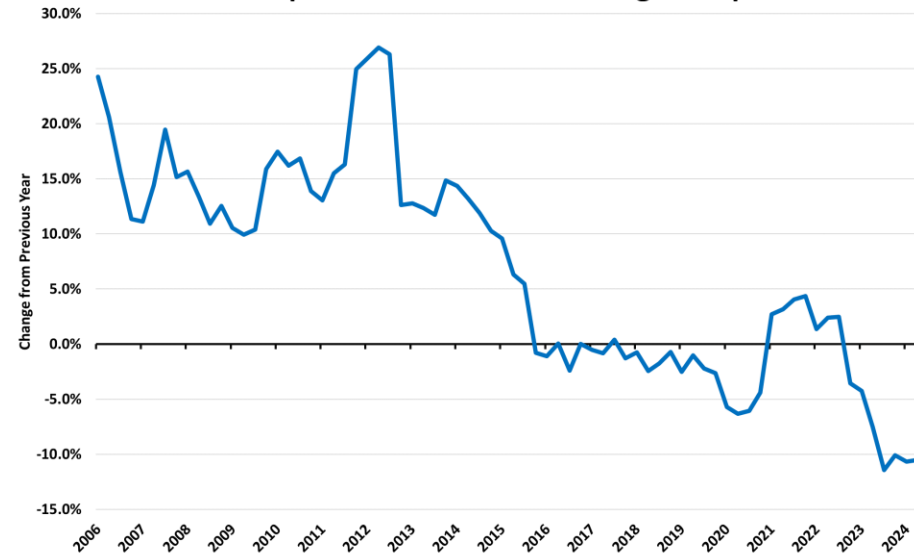
Chinese Real Estate Prices and Building Activity Are Falling.

China 70 Cities Newly Built Commercial Residential Building Prices



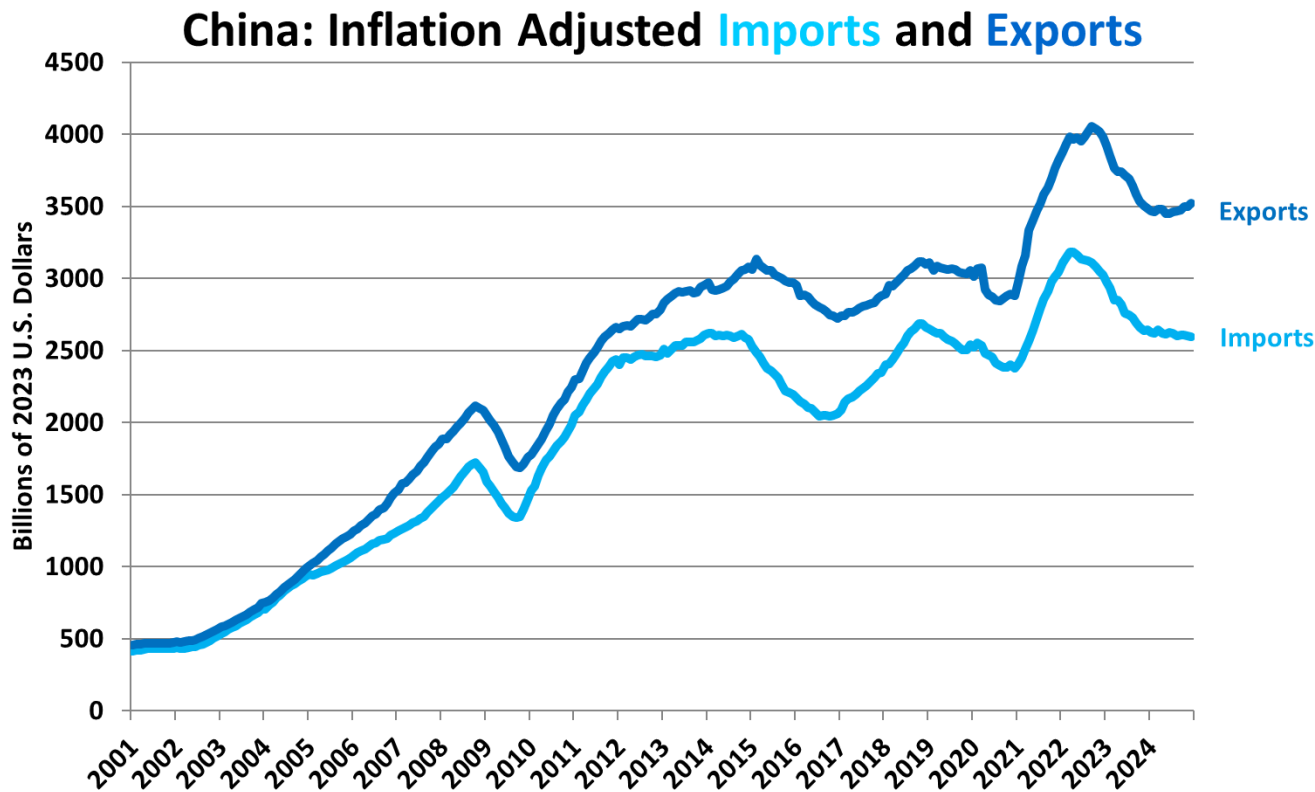
Source: Bloomberg Professional, CHHEAVGM, CME Economic Research Calculations

China Floor Space of Residential Buildings Completed



Source: Bloomberg Professional, CSTNSRES, CME Economic Research Calculations

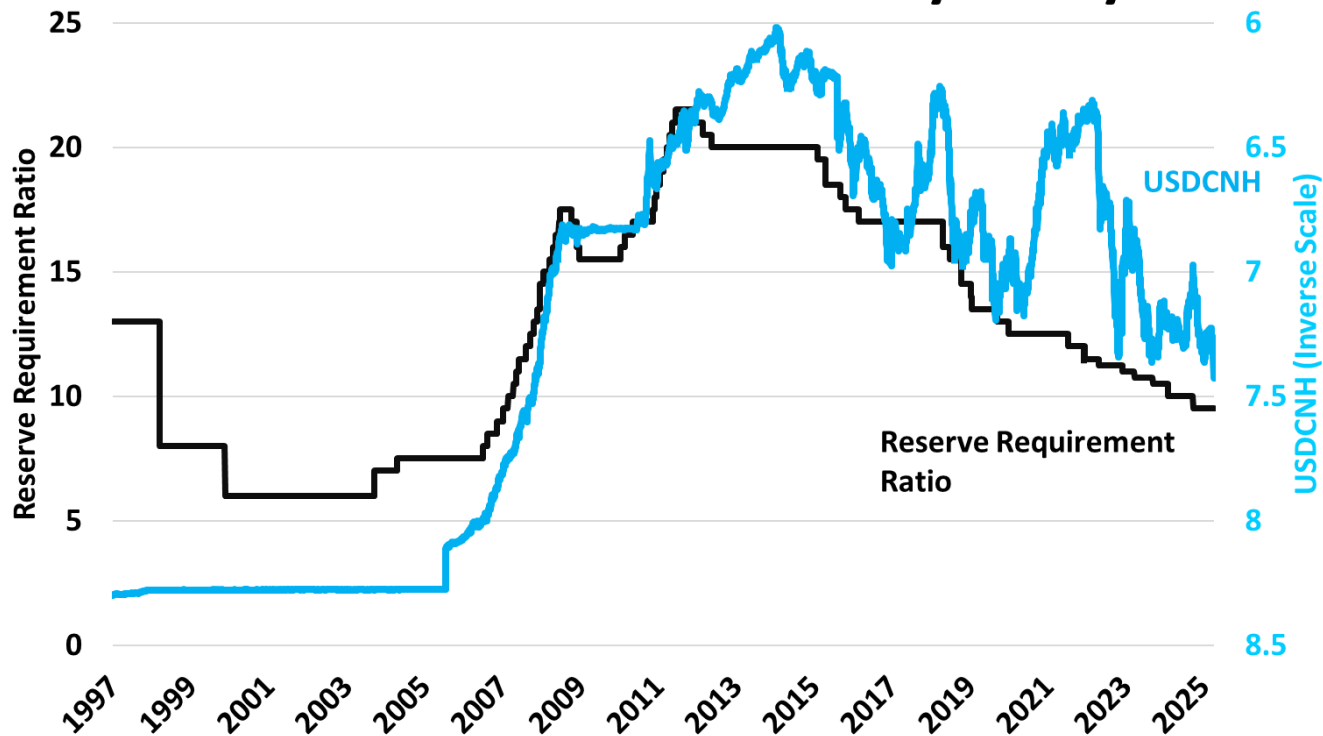
China's International Trade Is Vulnerable



Source: Bloomberg Professional, CNFRIMP\$ and CNFREXP\$

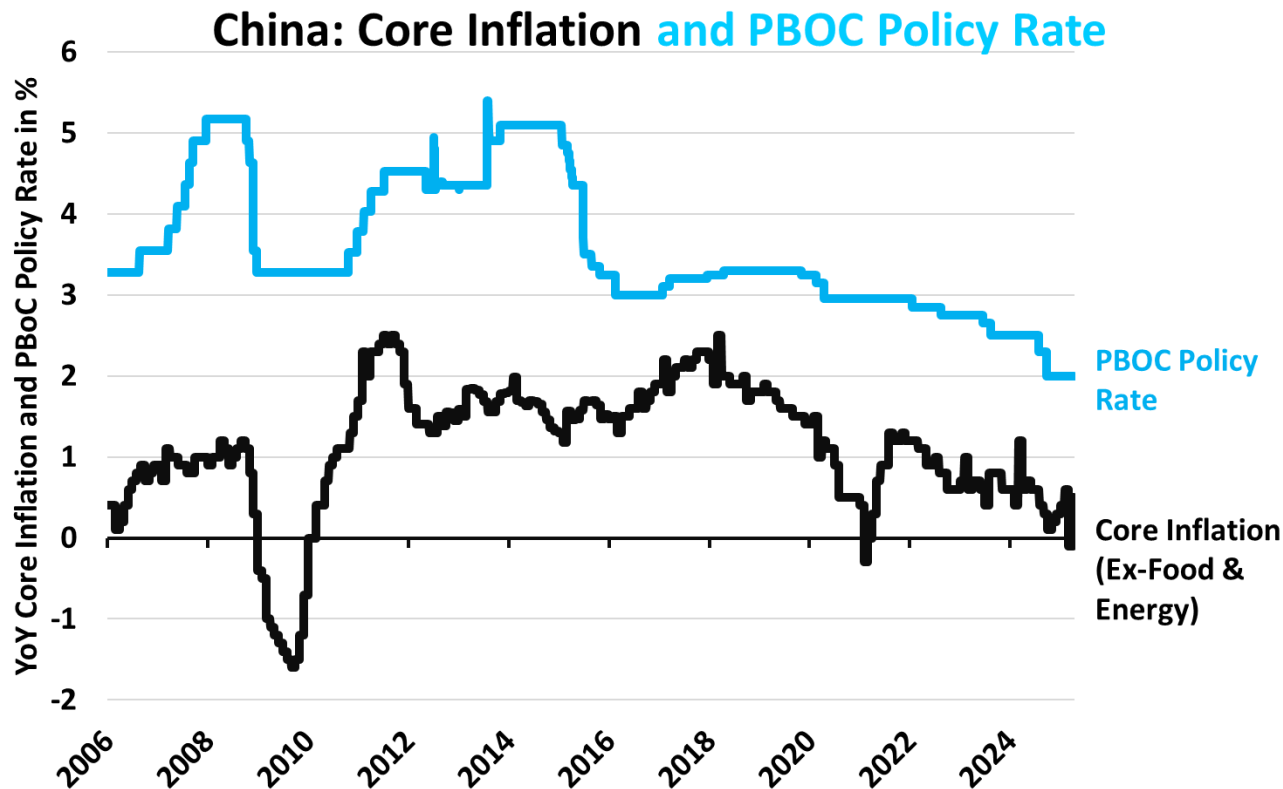
China Could Devalue It's Currency

Chinese Yuan and Monetary Policy



Source: Bloomberg Professional: (CHRRDEP, CNH and, pre-2011, CNY)

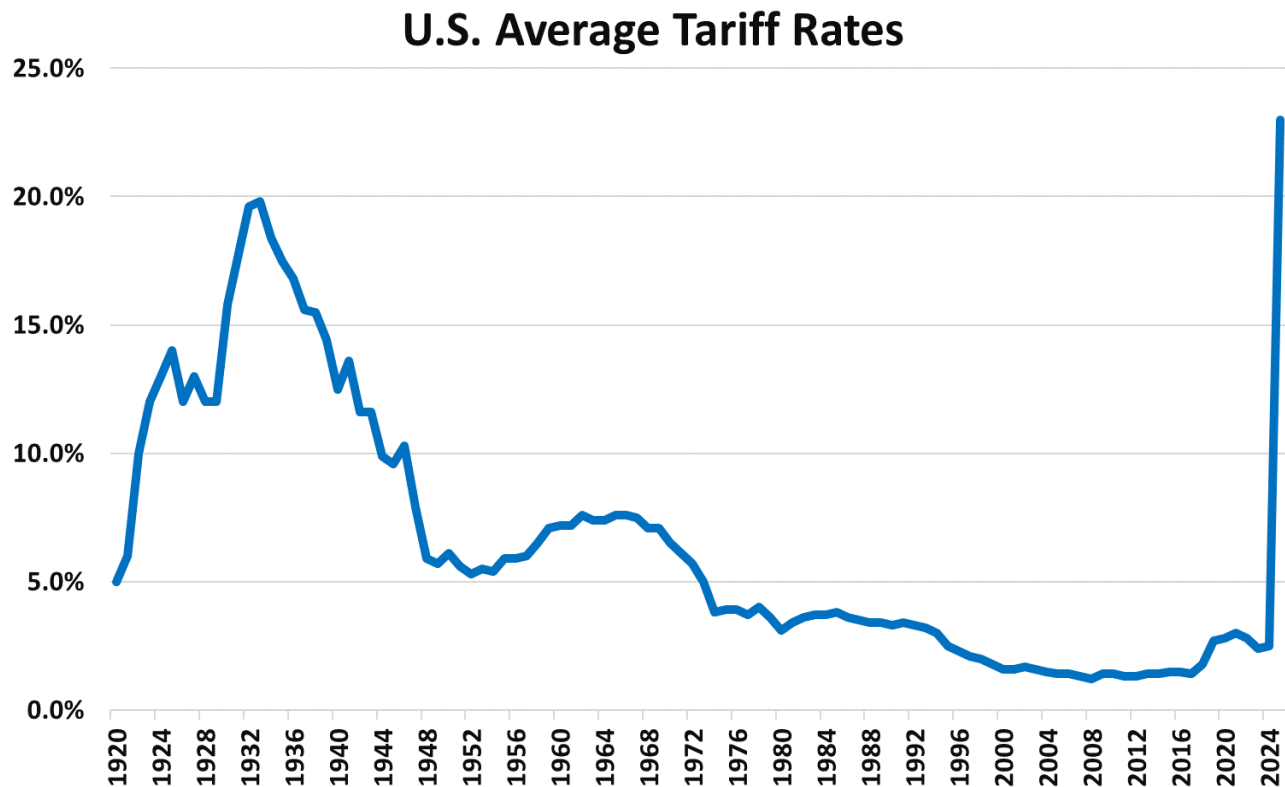
With Near Zero Inflation, Currency Devaluation Is an Obvious Choice.



Source: Bloomberg Professional (CHLLM1YR, PBOC7P, CNDR1Y, CNCPCRY)

Tariff Impacts

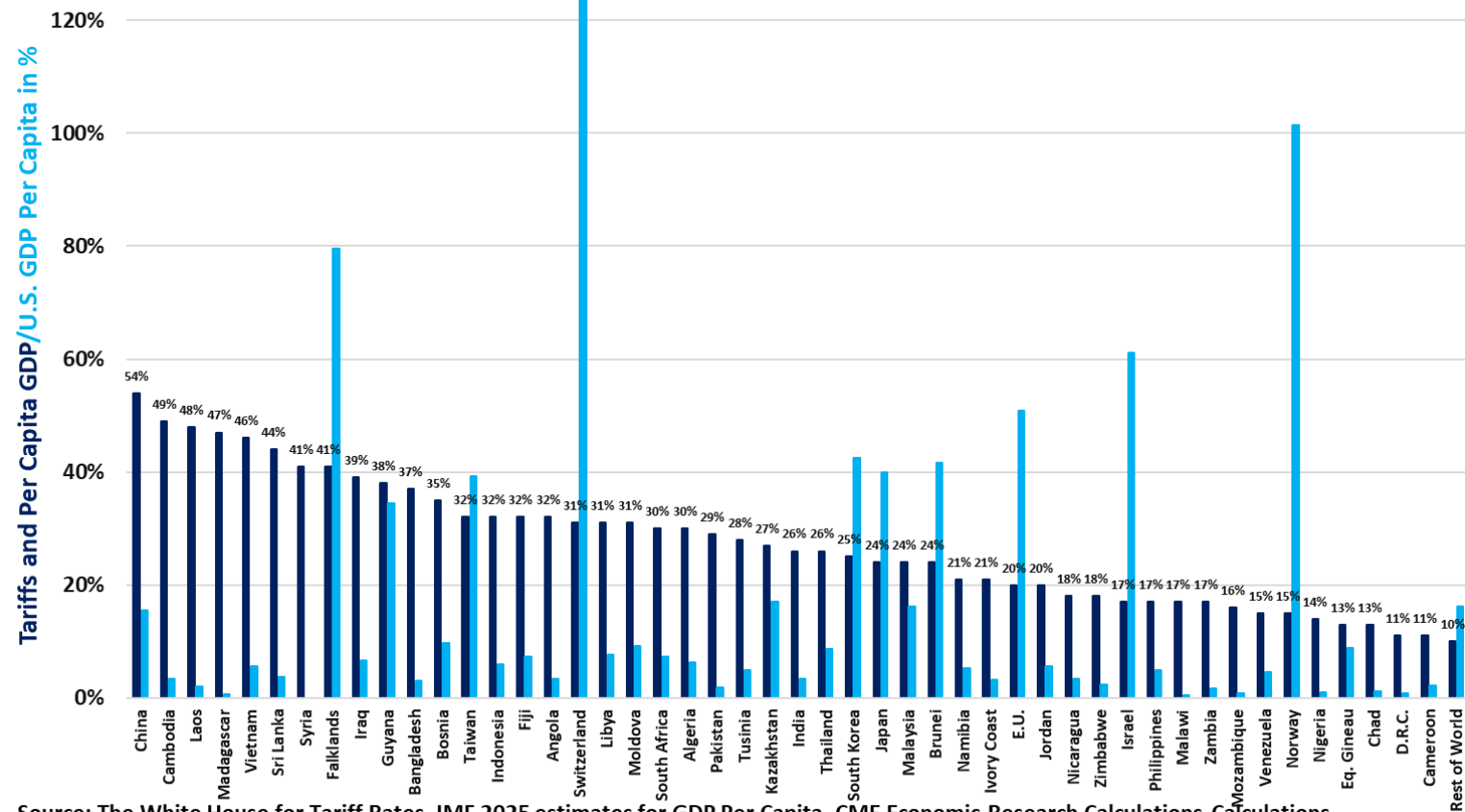
Trump Puts Tariffs Higher Than Smoot-Hawley in 1930.



Source: The Tax Foundation, with 2025 update from Paul Krugman's Substack

Were the Tariff Rates Decided by ChatGPT? Or a DOGE Intern?

"Liberation Day" Tariff Rates As Announced by the White House
GDP Per Capita As a Percentage of U.S.



The world's poorest countries dominate the list of the most heavily tariffed countries. How can someone in Madagascar who earns 1% of what the average American earns afford U.S. products?

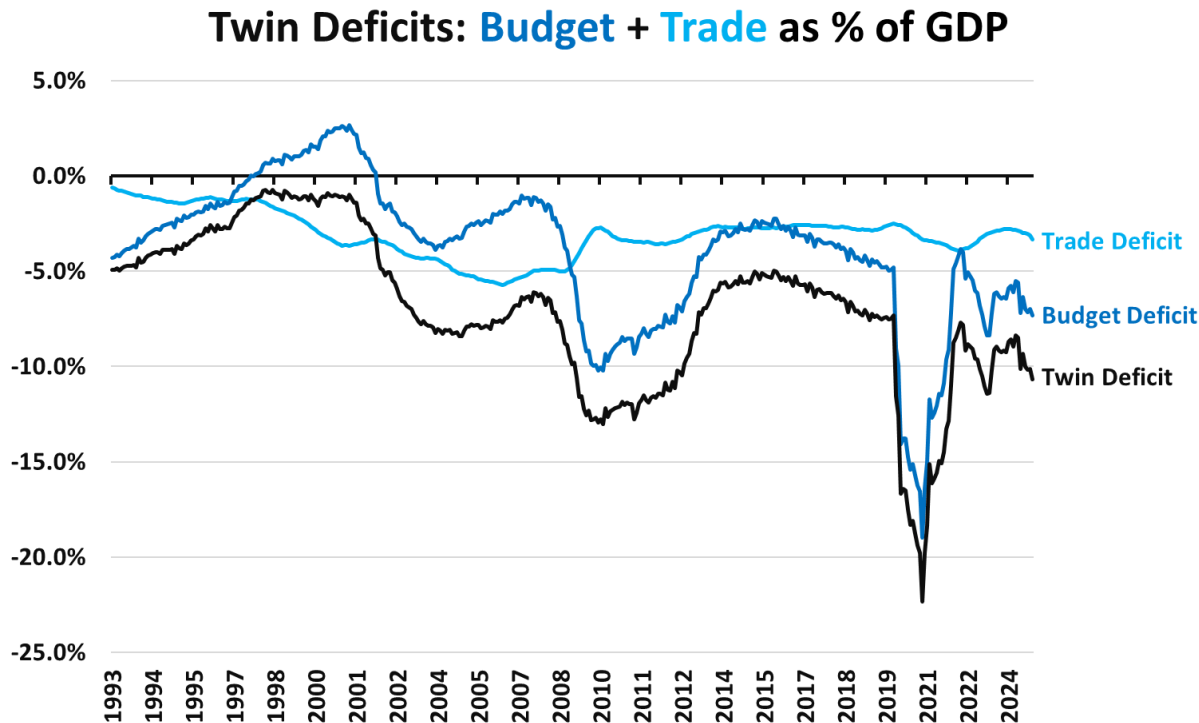
First Order Trade War Impacts on U.S. and China

U.S.	Additional Inflation	GDP Impact	Net Tariff Revenue as a % of GDP
Scenario A (No Rerouting)	5.0%	-2.8%	2.6%
Scenario B (Rerouting via 3rd Countries)	1.5%	-1.8%	2.0%

China	Additional Inflation	GDP Impact	Net Tariff Revenue as a % of GDP
Scenario A (No Rerouting)	-0.1%	-1.9%	-0.2%
Scenario B (Rerouting via 3rd Countries)	-0.1%	-1.4%	-0.1%

Source: CME Group Economic Analysis

The Tariffs Seem Designed to “Solve” Two Problems: Trade & Budget Deficits.



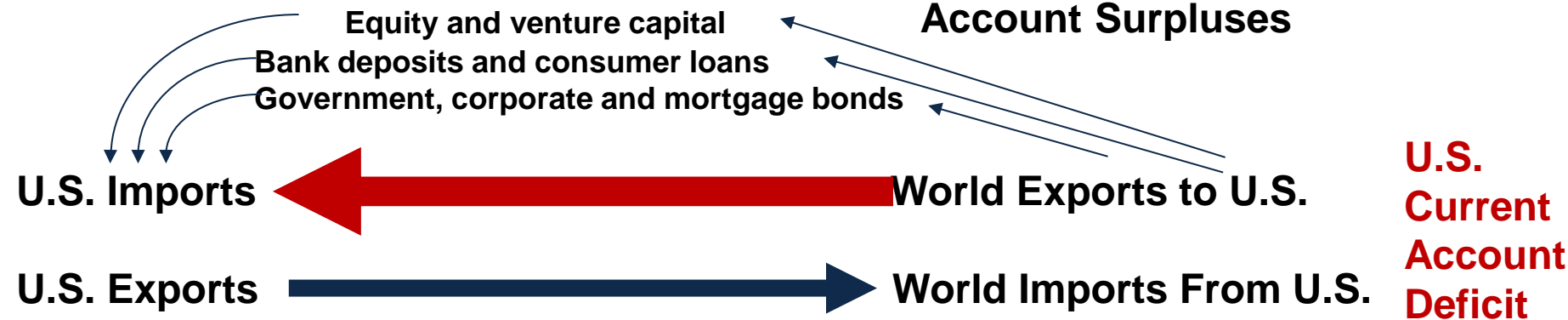
Source: Bloomberg Professional (FDDSSD, USTBTOT, GDP CUR\$)

Capital Flows Into the U.S. Fund the Trade Deficit

Trade Equation: **Current Account** + Capital Account + Financial Account = 0

Capital Flows Into the U.S.

U.S. Financial and Capital
Account Surpluses



Inward investment flows lower U.S. borrowing costs, raise the value of equities and fund consumer loans via bank deposits as well as venture capital etc. The U.S. trade deficit may be a consequence of these inward investment flows and the fact of having the U.S. dollar as the global reserve currency. A **current account deficit** MUST be offset by equivalent sized capital and financial account surpluses.

Contradictory Justifications for Tariffs

- 1) The tariffs are negotiating tools designed to get better trade agreements for the U.S.
- 2) Tariffs are being implemented to reindustrialize the United States.
- 3) Tariffs are meant to reduce the budget deficit by bringing in government revenue or to allow for other tax cuts or at least an extension of the 2017 tax cut.

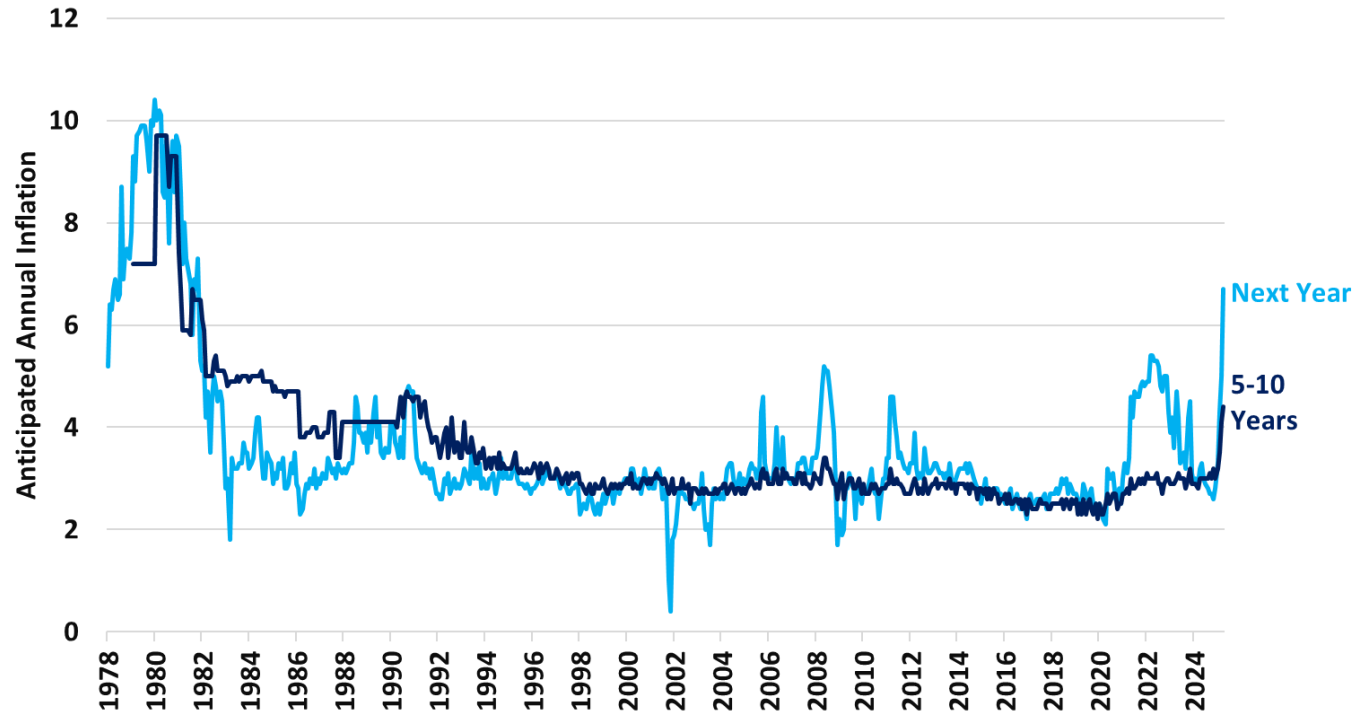
Number 1 can't coexist with numbers 2 and 3. Nobody is going to invest in U.S. factories if they think that the tariffs are temporary and won't offer permanent protection from foreign competition. If the tariffs are merely negotiating tools that will go away quickly, there won't be any lasting revenue to reduce the budget deficit or fund additional tax cuts. Moreover, the equity and bond markets' negative reaction weakens Trump's ability to negotiate.

If Tariffs Are Negotiating Tools, What Does the U.S. Want?

- 1) A reduction in other countries' trade barriers?
- 2) Agreements to buy more U.S. goods?
- 3) Accepting dollar devaluation?
- 4) Shifting holdings of U.S. Treasuries from short-term bonds to longer term bonds?

Inflation Expectations Hit Highest Levels in Decades on Tariffs.

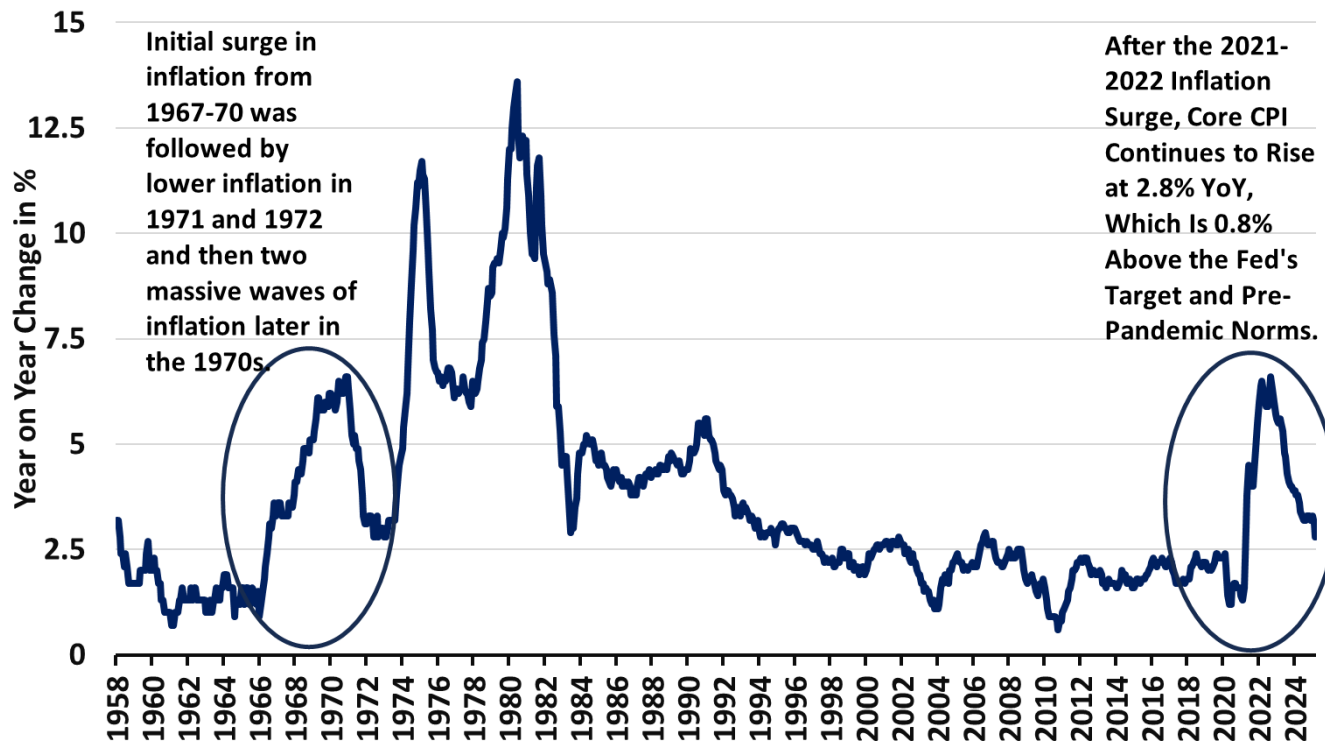
Median Inflation Expectations University of Michigan Consumer Confidence Survey



Source: Bloomberg Professional (CONSP5MD and CONSPXMD)

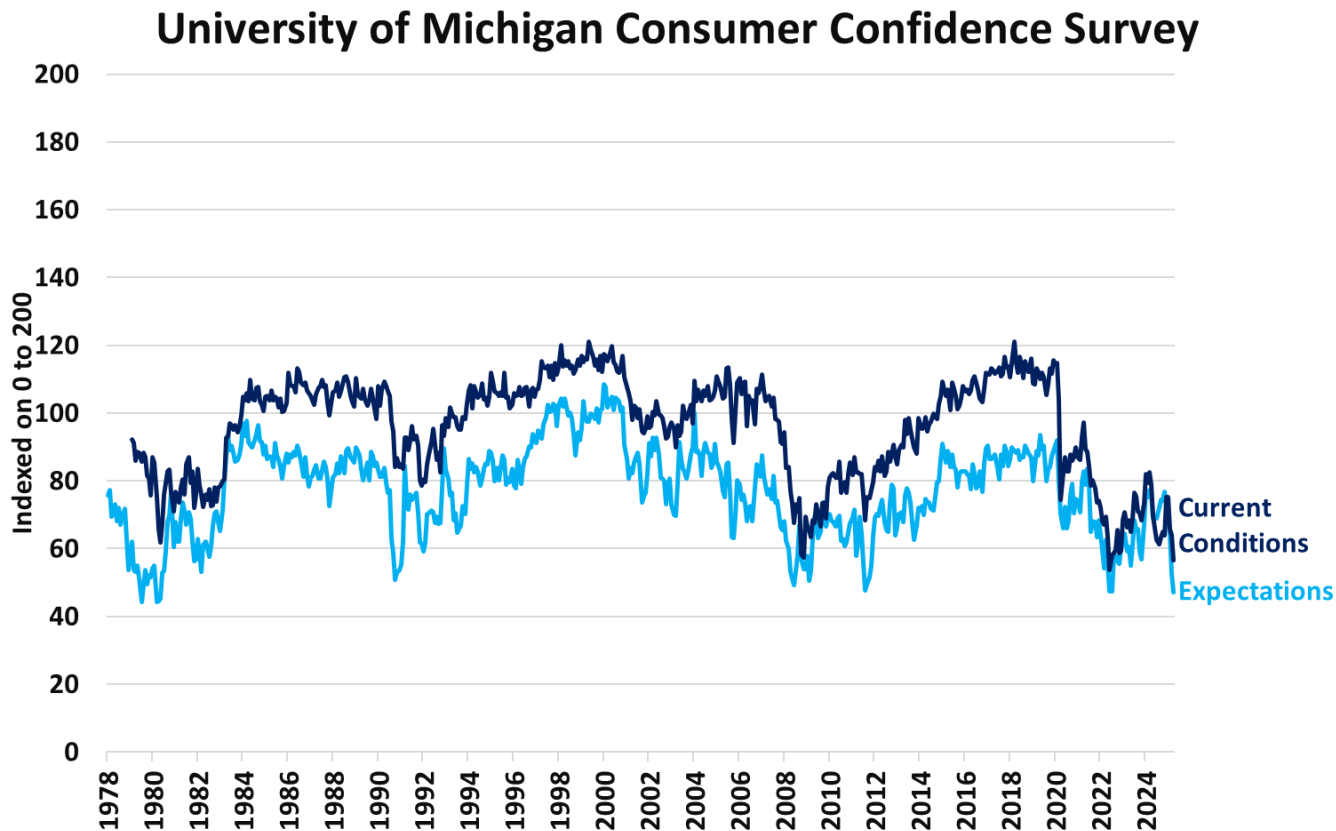
U.S. Core Inflation Still at 2.8%, 0.8% Above Target.

U.S. Core CPI



Source: Bloomberg Professional (CPIXYOY)

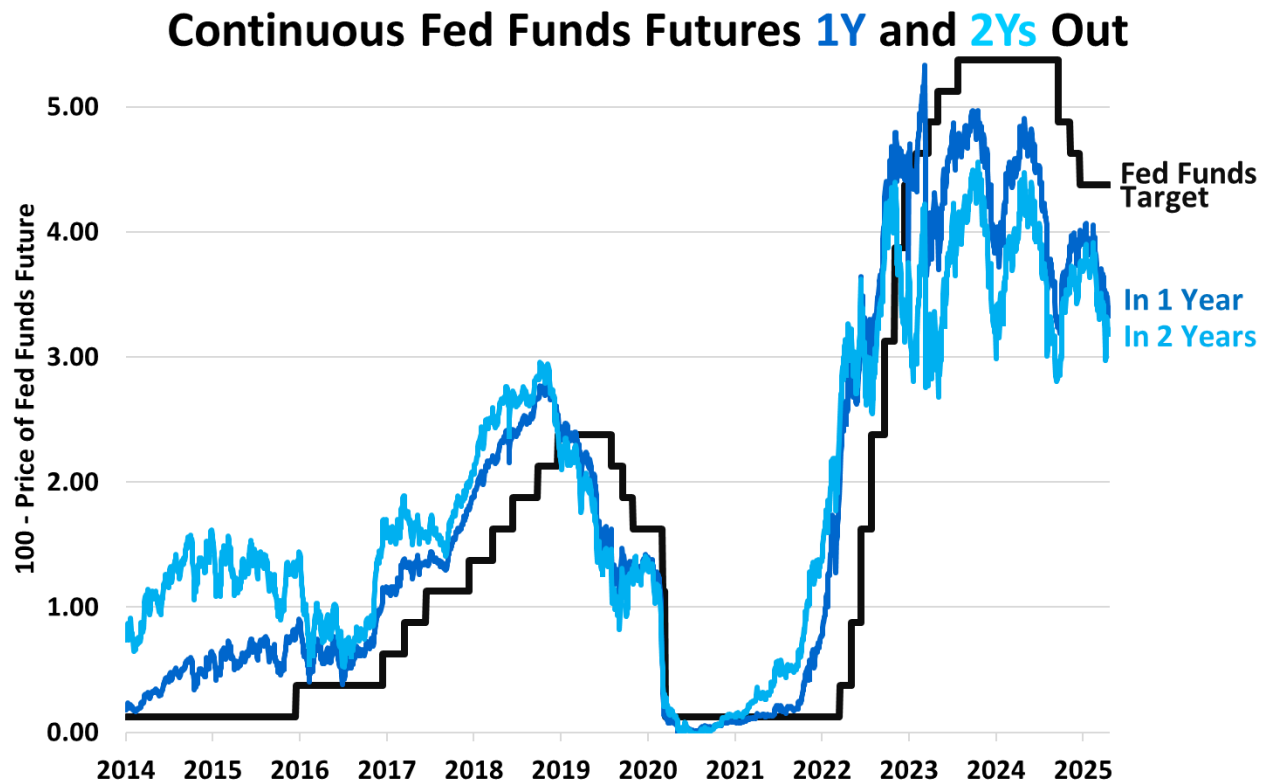
U.S. Consumer Confidence Collapsed to Lowest Since 1980.



Source: Bloomberg Professional ([CONSCURR](#) and [CONSEXP](#))

Copper and Equity Markets, Gold and Silver

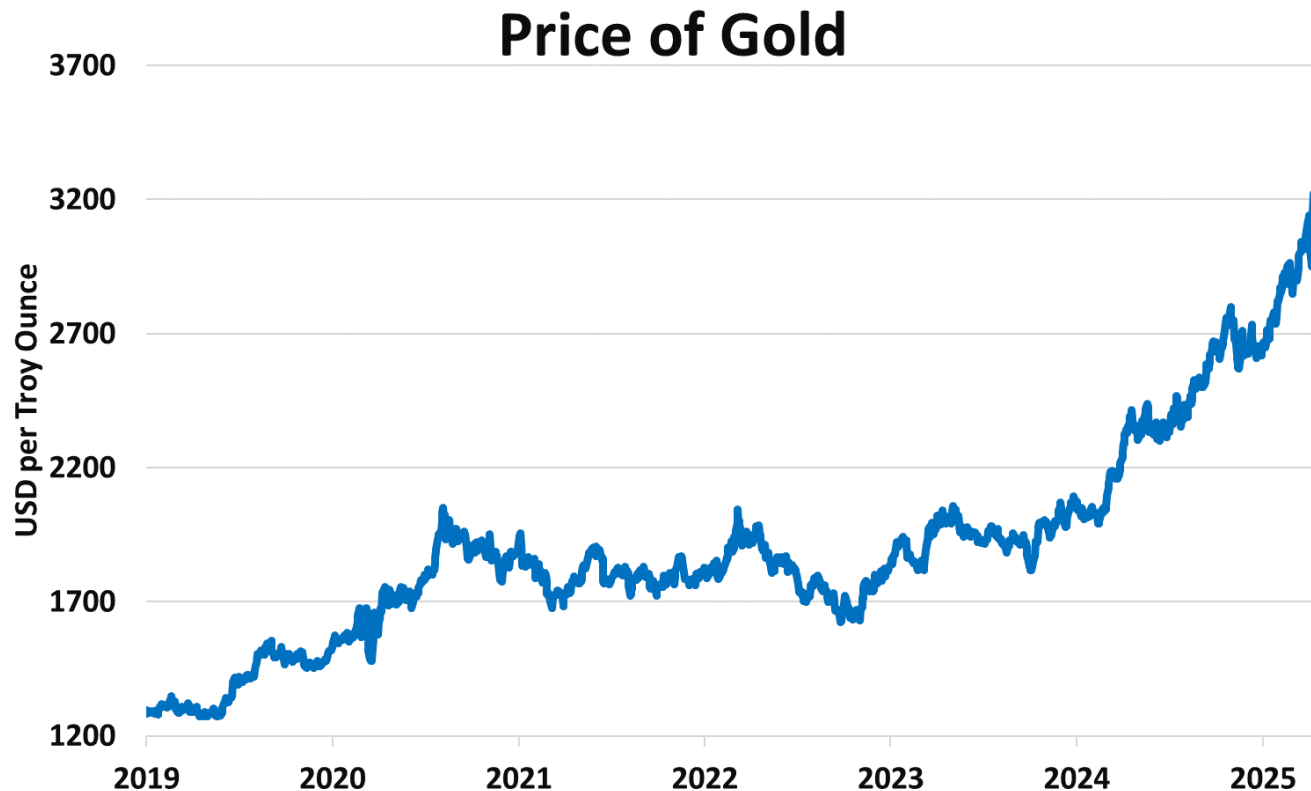
Markets Expectations for Fed Policy Remain Volatile.



Source: Bloomberg Professional (FF1 ... FF24), CME Economic Research Calculations

Investors are torn between concerns about inflation remaining above target and signs that the U.S. economy might be beginning to slow.

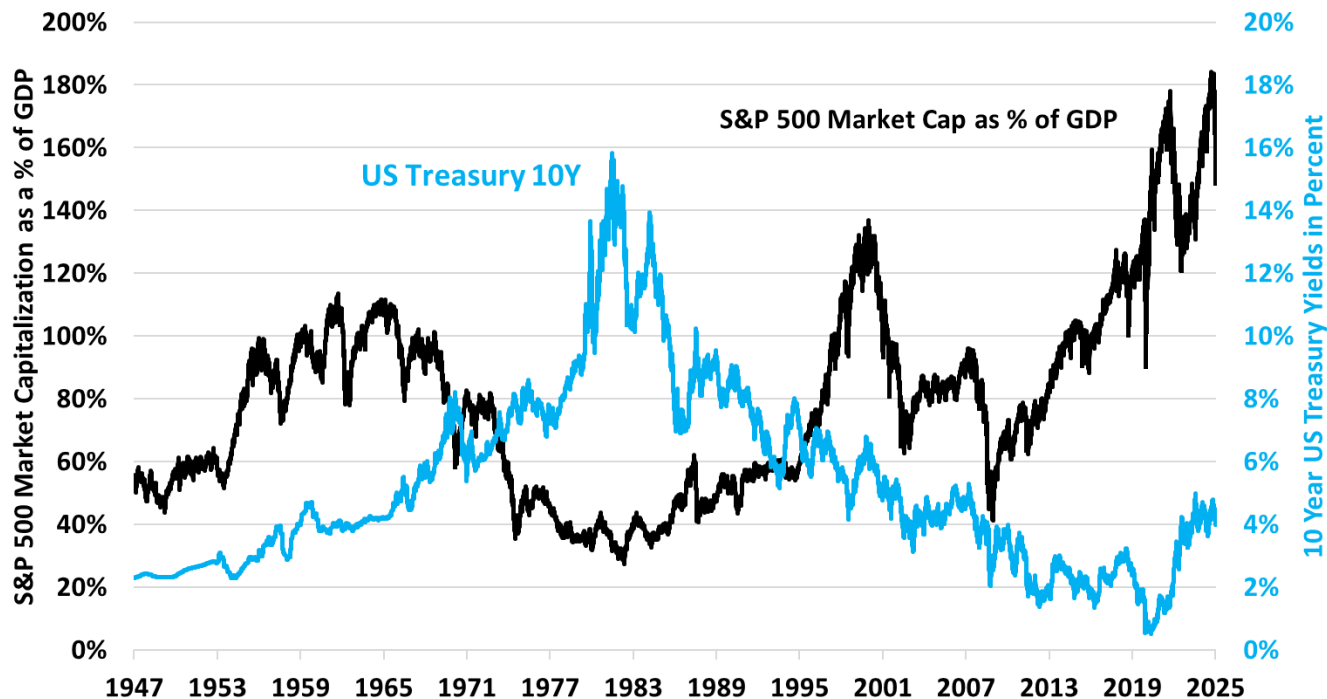
Gold Breaks \$3500 Per Ounce



Source: Bloomberg Professional (GC1)

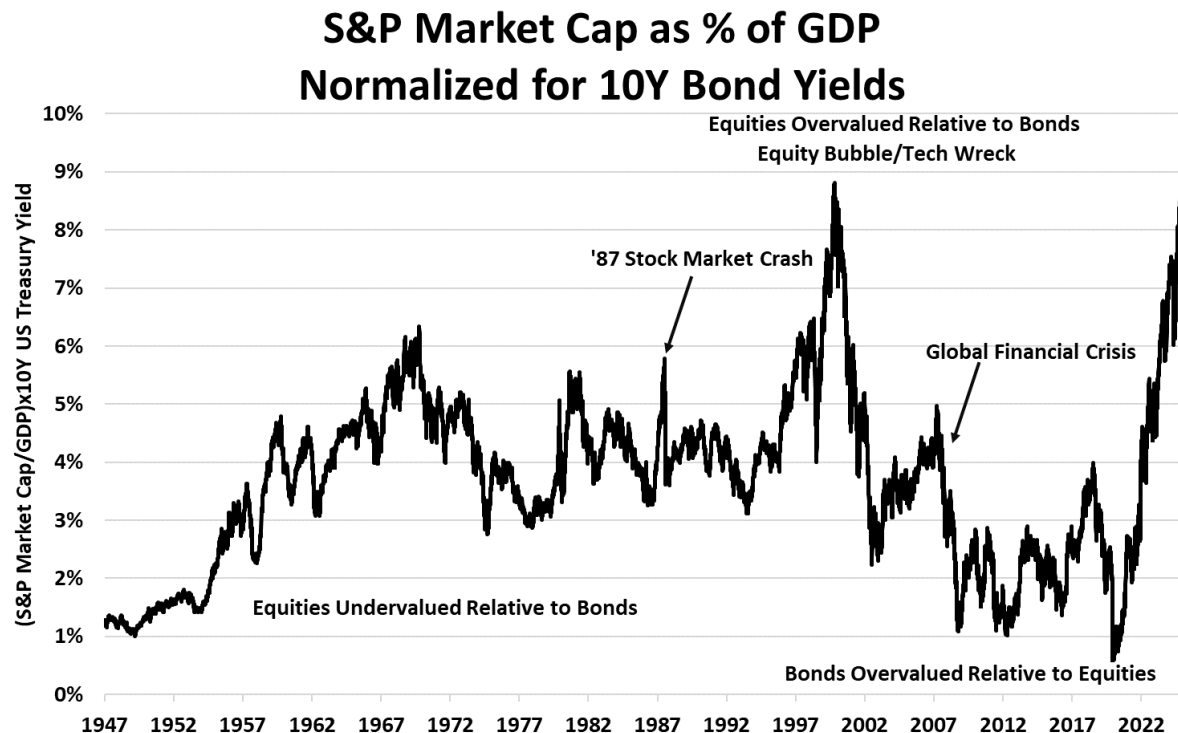
U.S. Equities Have Rarely Had Such High Valuations.

S&P 500® Market Cap / Nominal US GDP versus 10Y Treasuries



Source: Bloomberg Professional (SPX, GDP CUR\$, [USGG10YR](#)), [www.multipl.com](#) for bond yields pre-1962.

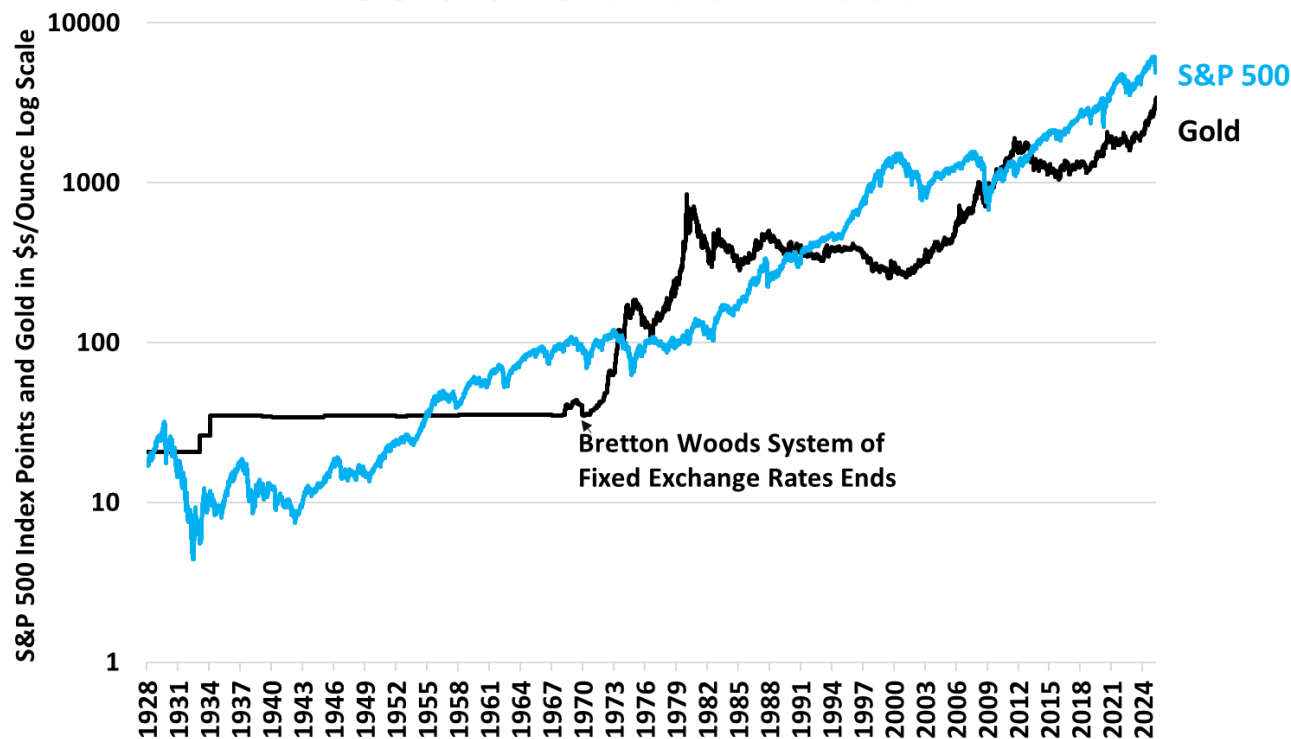
Even After The Recent Correction, U.S. Stocks Are Still Pricy Relative to Bond Yields.



Source: Bloomberg Professional (SPX, GDP CUR\$ and USGG10YR), with www.multipl.com for pre-1962 bonds.

Since 1928, Gold Has Nearly Kept Pace With The S&P 500

Gold and the S&P 500®



Source: Bloomberg Professional (GOLDS and SPX)

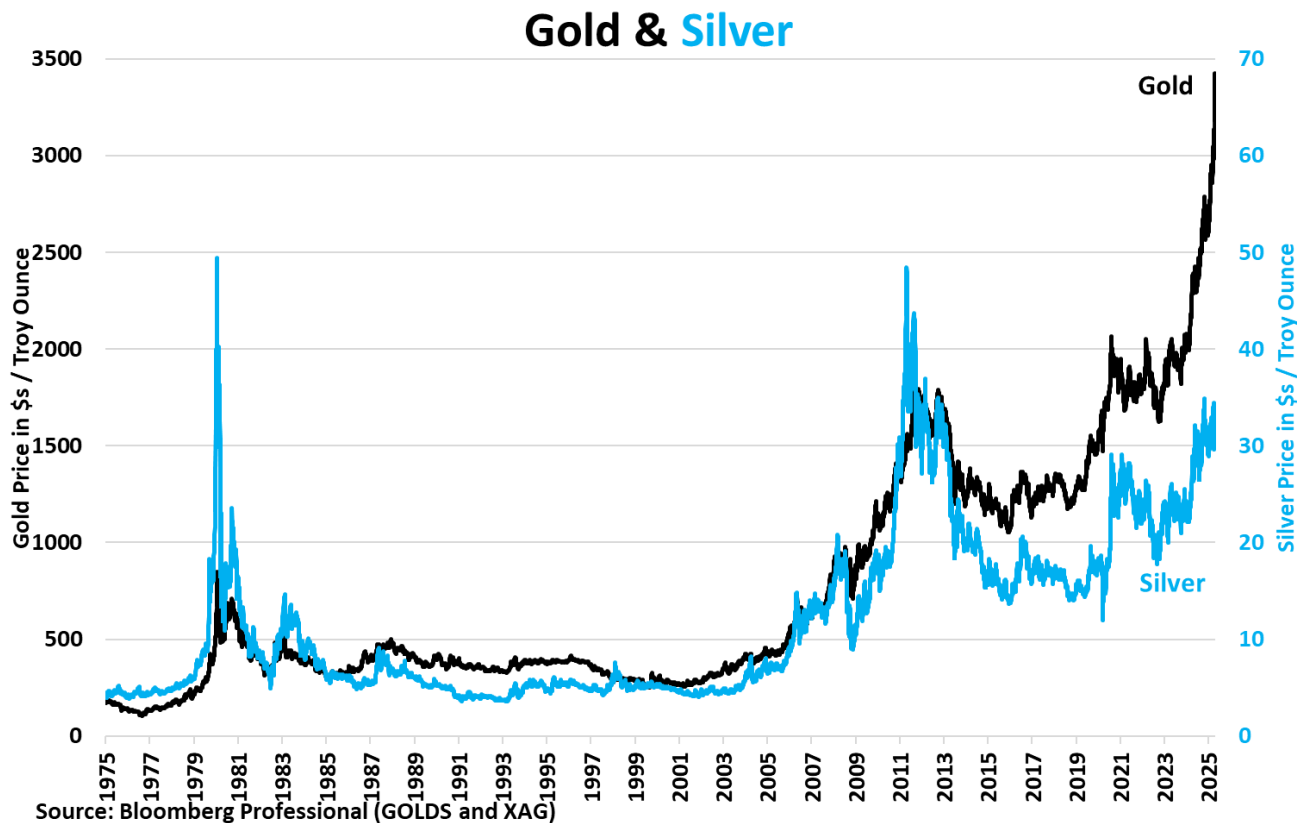
S&P 500 Repriced in Troy Ounces of Gold Rather Than USD

S&P 500® / Gold Ratio in Logs

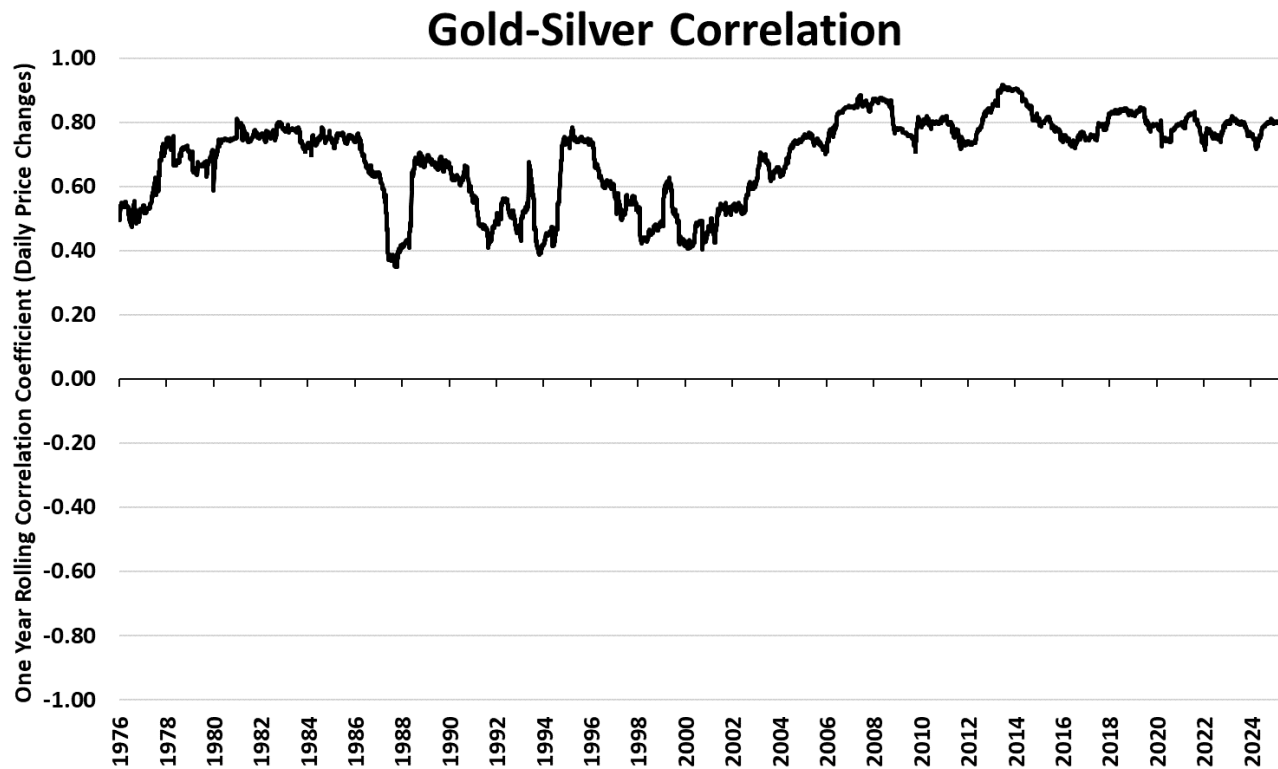


Source: Bloomberg Professional (GOLDS and SPX)

Gold Is Leaving Silver In the Dust



Gold and Silver Are Highly Correlated On a Day to Day Basis



Source: Bloomberg Professional (GOLDS and XAG) with CME Group Economics Research Calculations

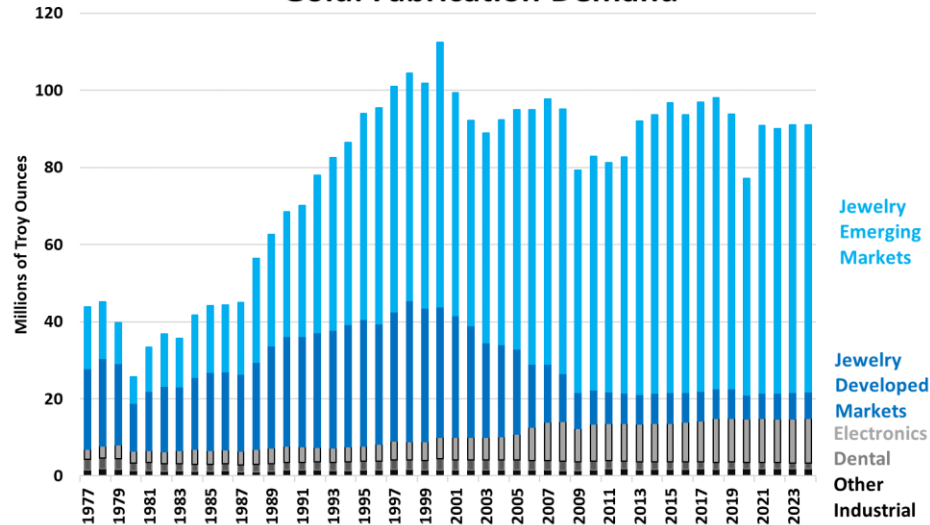
The Gold/Silver Ratio Has Rocketed in Recent Weeks.



Source: Bloomberg Professional (GOLDS and XAG)

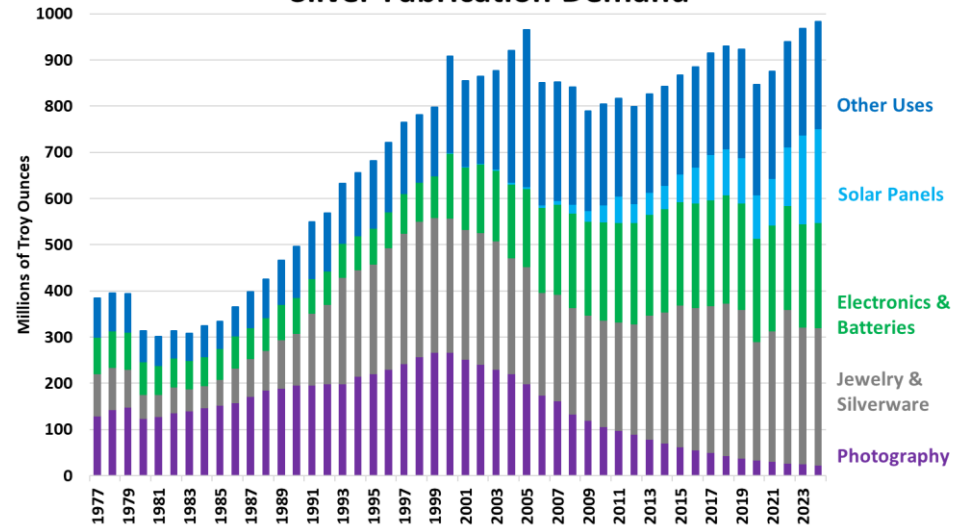
Gold Is the More Purely Precious of the Two Metals

Gold: Fabrication Demand



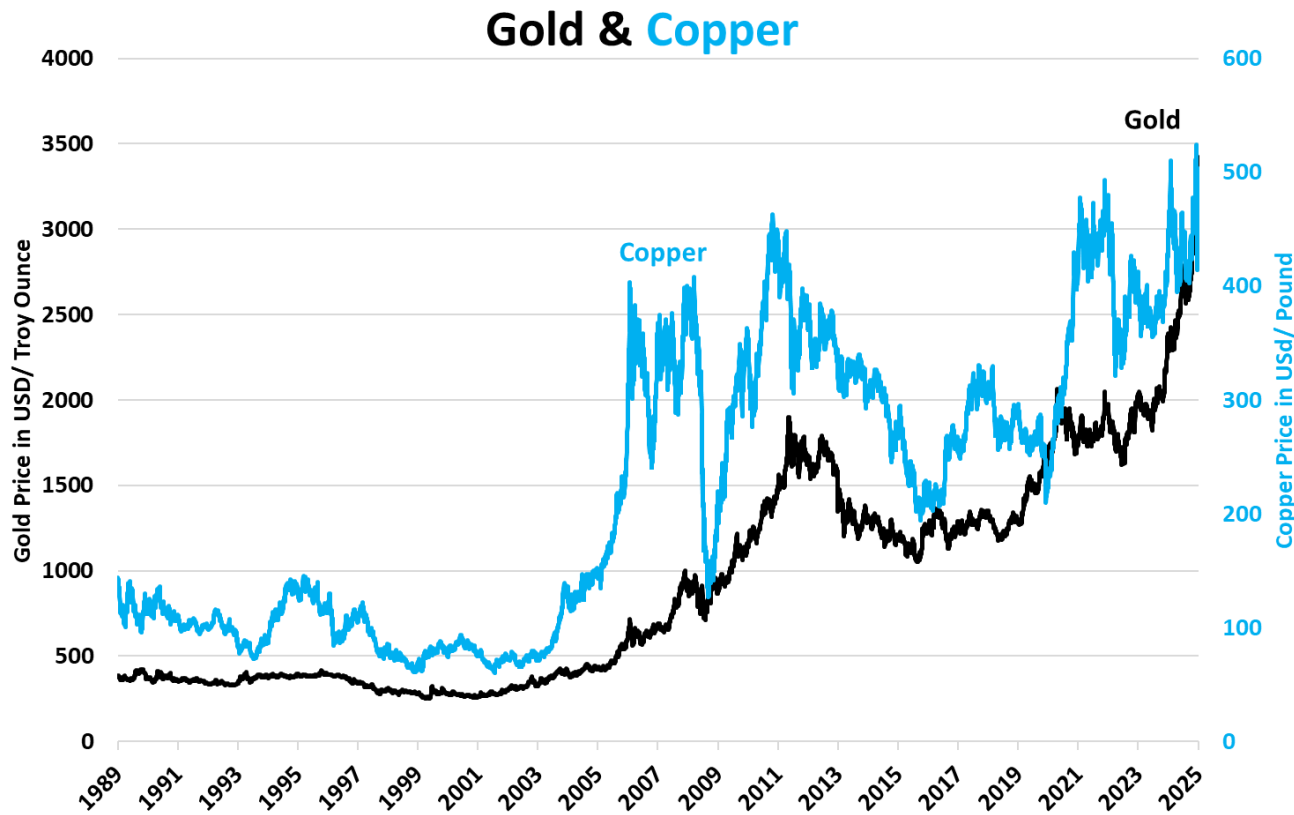
Source: CPM Group Gold Yearbook 2024

Silver Fabrication Demand



Source: CPM Group Silver Yearbook 2023

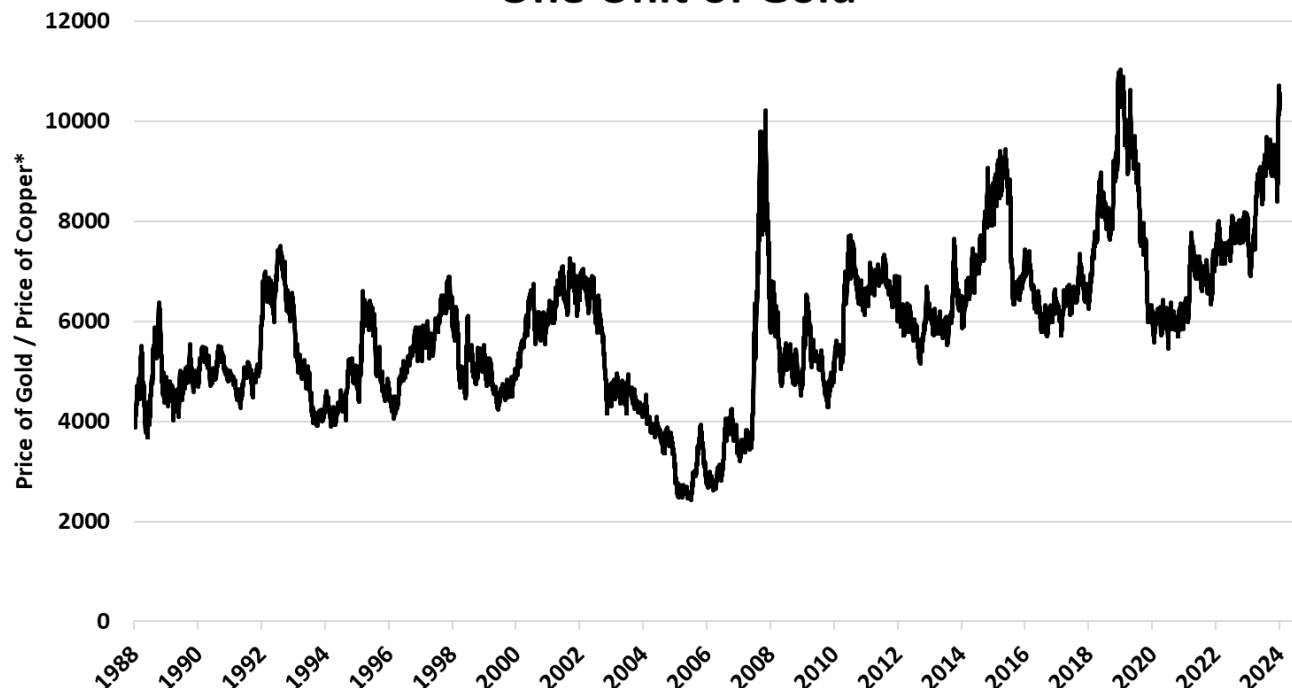
In Recent Weeks Copper Prices Have Fallen Has Gold Has Soared.



Source: Bloomberg Professional (GOLDS and HG1)

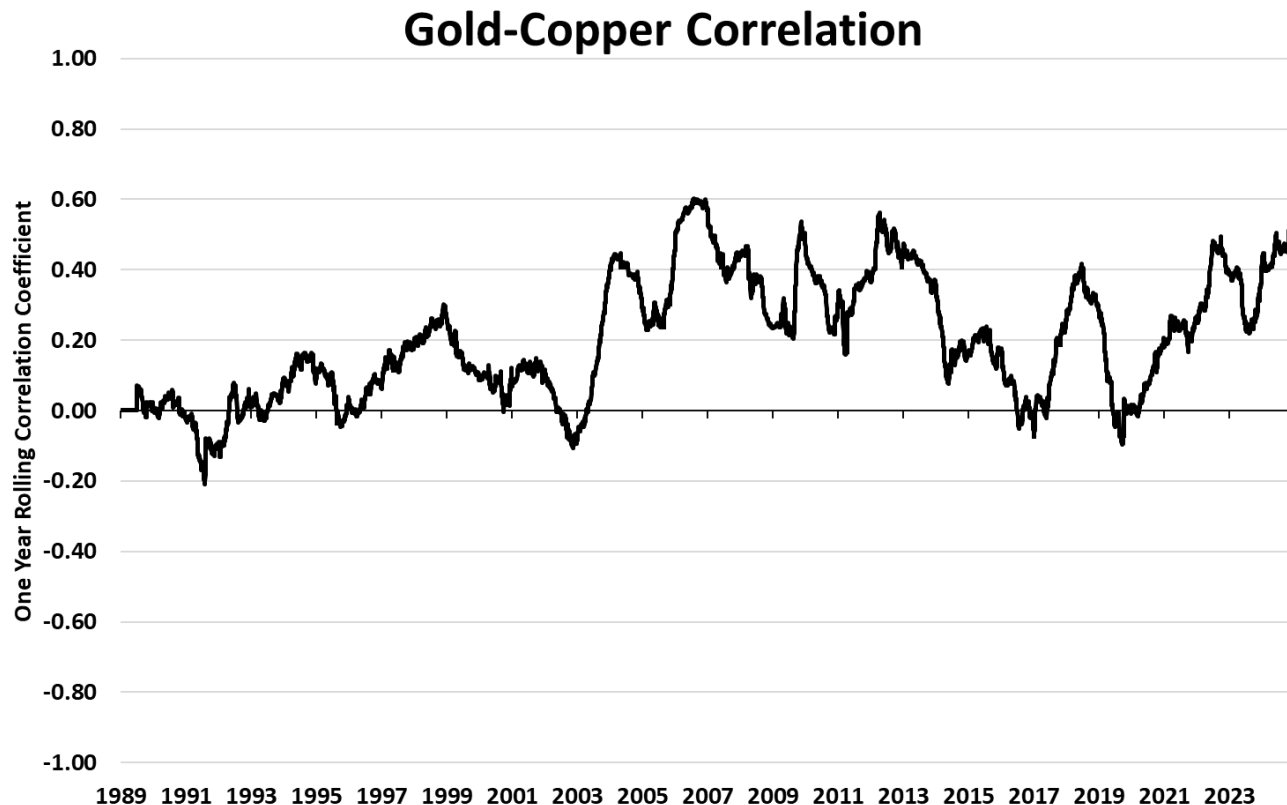
The Gold/Copper Ratio Is Near a Record High.

Number of Units of Copper One Can Buy with One Unit of Gold



Source: Bloomberg Professional (GOLDS and HG1), *Unit Conversion = 14.58 Troy Ounces per Pound, 100 USD/USD.
Gold/Copper ratio = (Gold price in USD per Troy Ounce/Copper price in USD/Pound) = (Gold Price /Copper Price)* 1458.

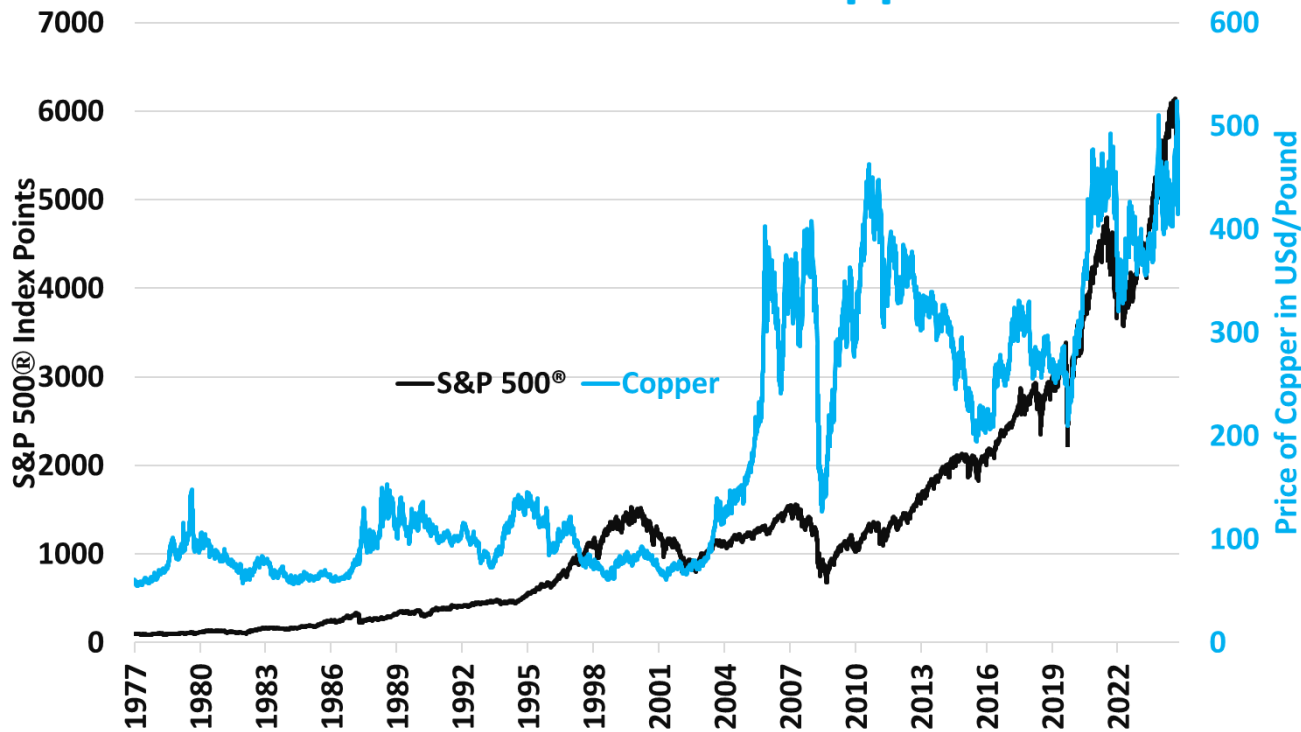
The Gold Copper Correlation Remains Near +0.45.



Source: Bloomberg Professional (GOLDS and HG1) with CME Group Economics Research Calculations

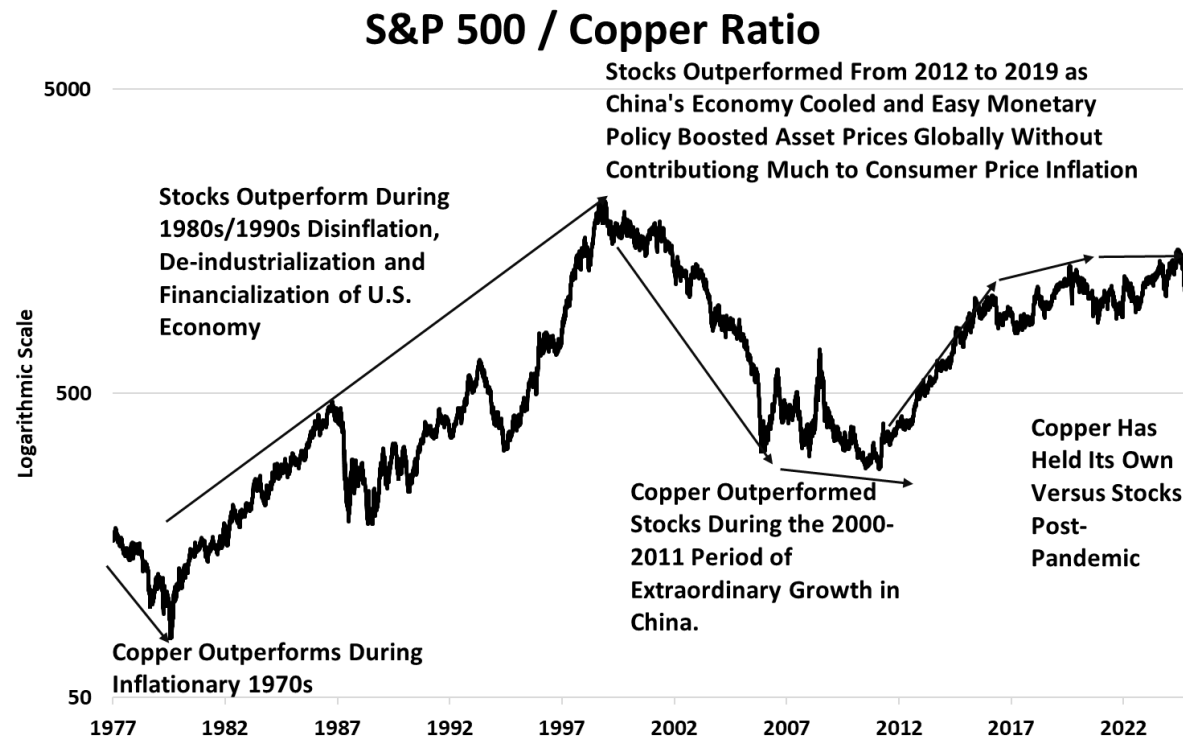
Since The Pandemic Copper and U.S. Stocks Have Been Closely Tied.

S&P 500® and Copper



Source: Bloomberg Professional (SPX and [HG1](#))

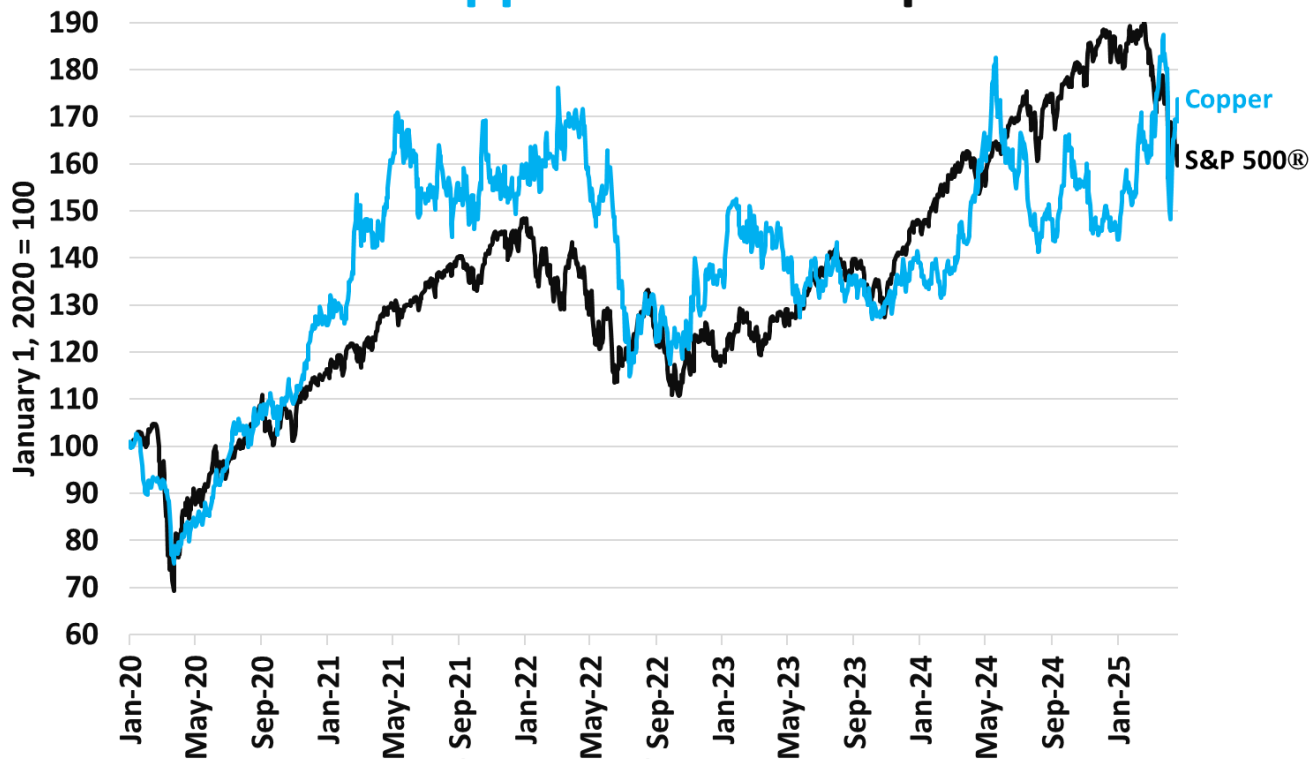
The S&P Copper Ratio Is Tied to the Financial Versus Industrial Strength of the Global Economy.



Source: Bloomberg Professional (SPX and HG1)

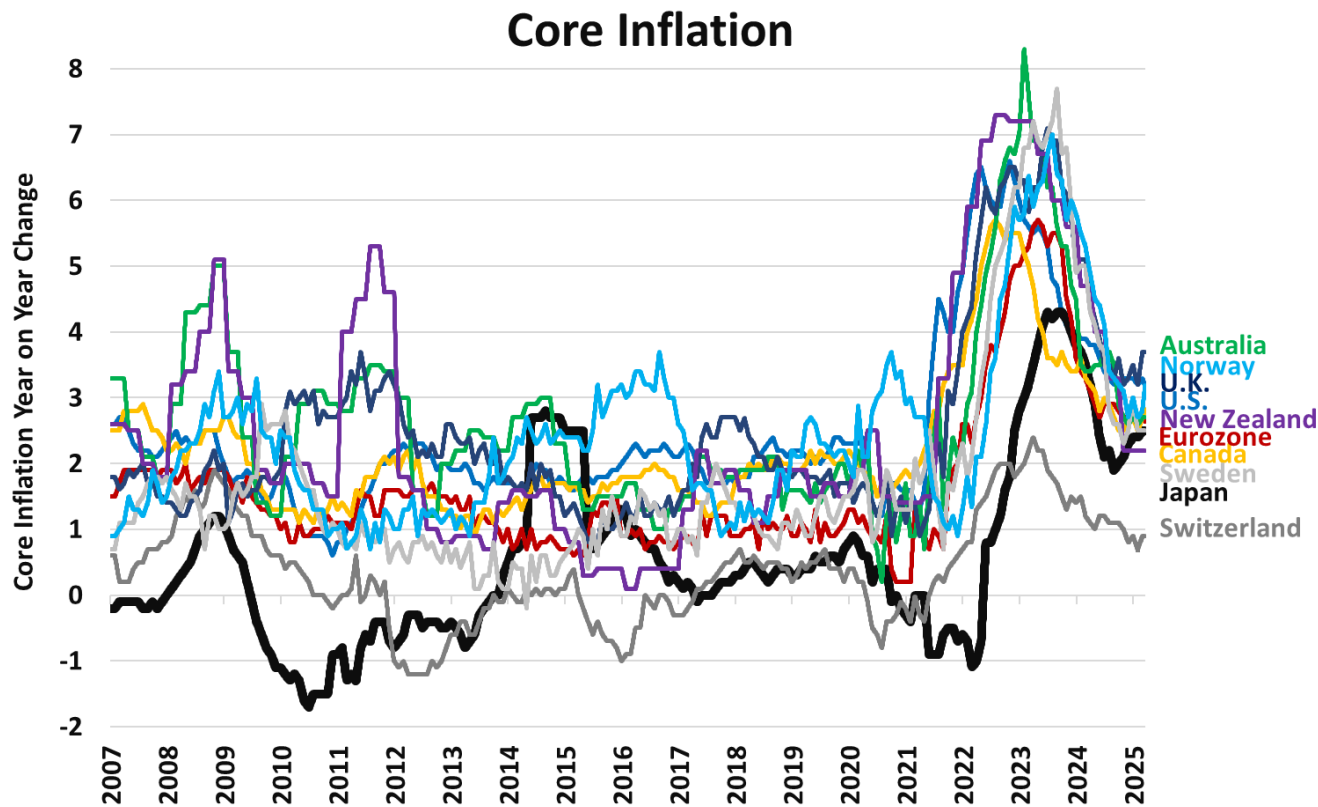
Since The Pandemic Copper and U.S. Stocks Have Been Closely Tied.

Copper and U.S. Equities



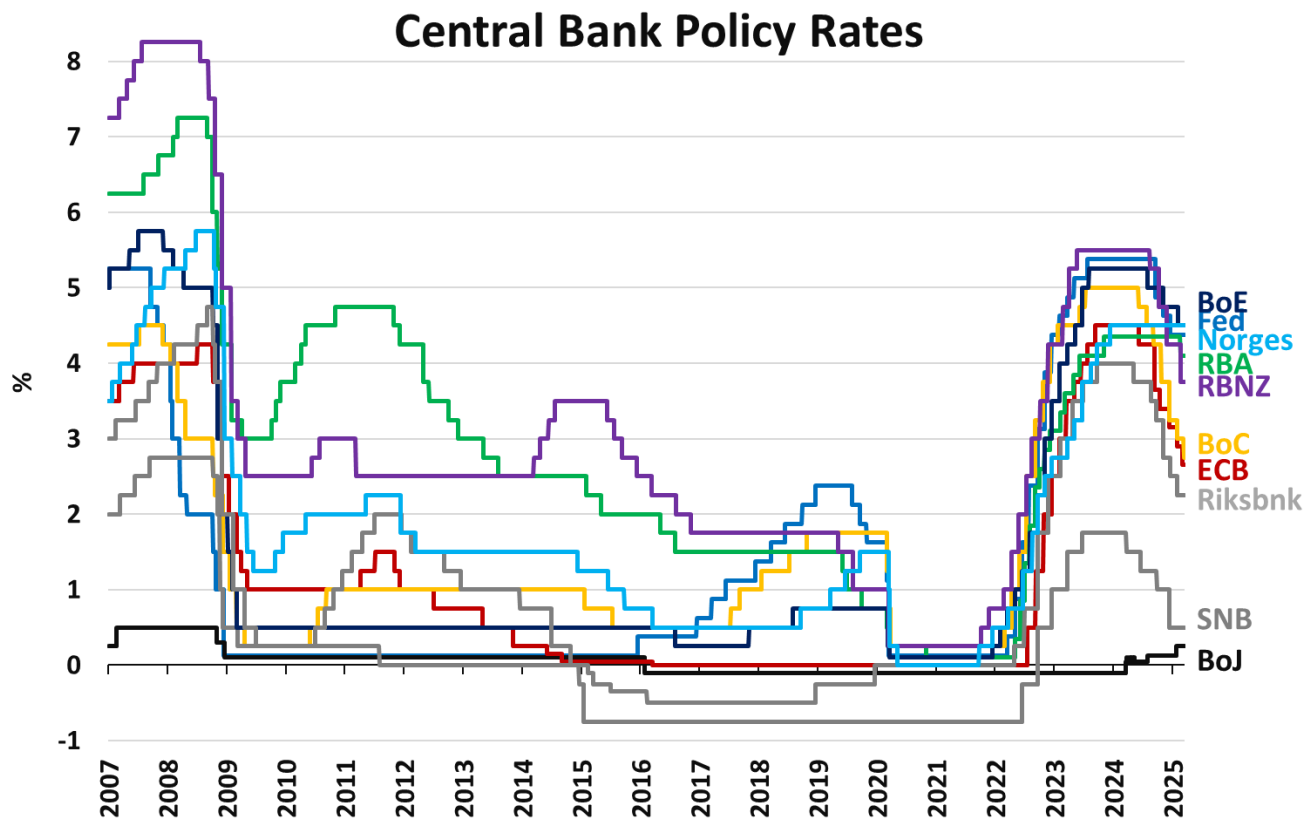
Source: Bloomberg Professional (SPX and HG1)

And the U.S. Is Not Alone: Core Inflation Is Above Target Nearly Everywhere.



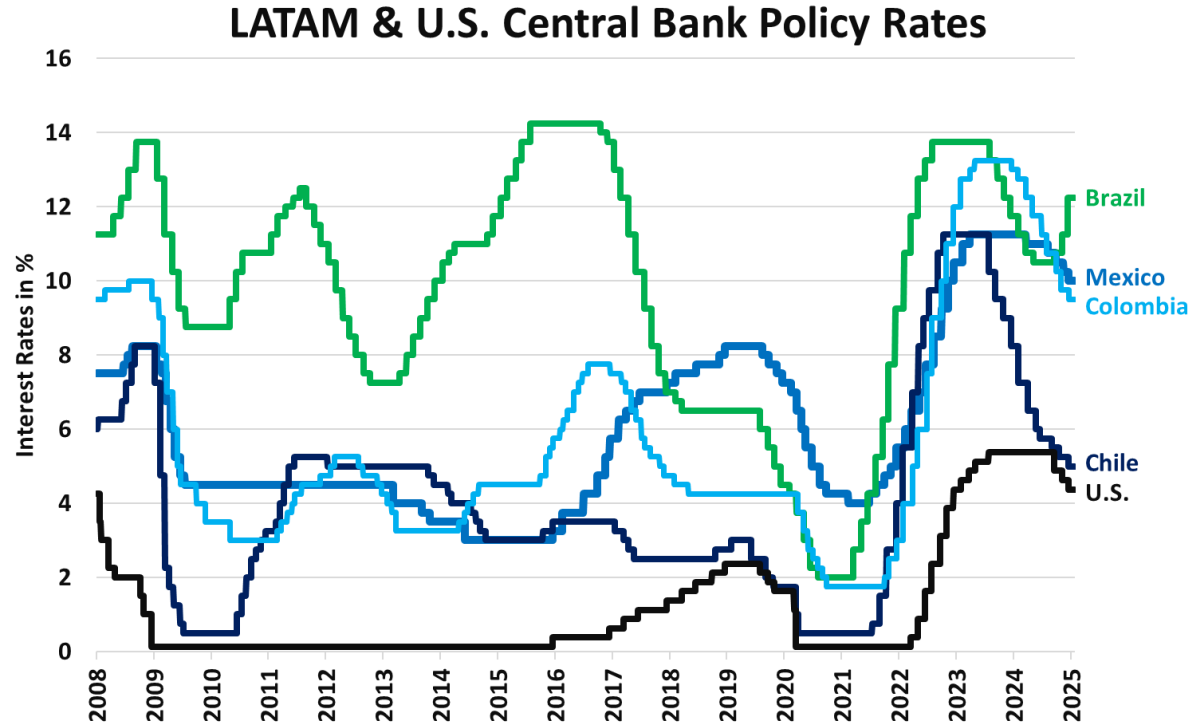
Source: Bloomberg Professional (CPI XY0Y, CACPTY0Y, UKHCA9IC, CPIEXEMUY, JPCNEFEY, ACPMXVLY, NOCPULLY, CPEXSEYY, SZEXIYOY, NZCPIYOY)

Despite Above Target Inflation, Central Banks Are Slashing Rates



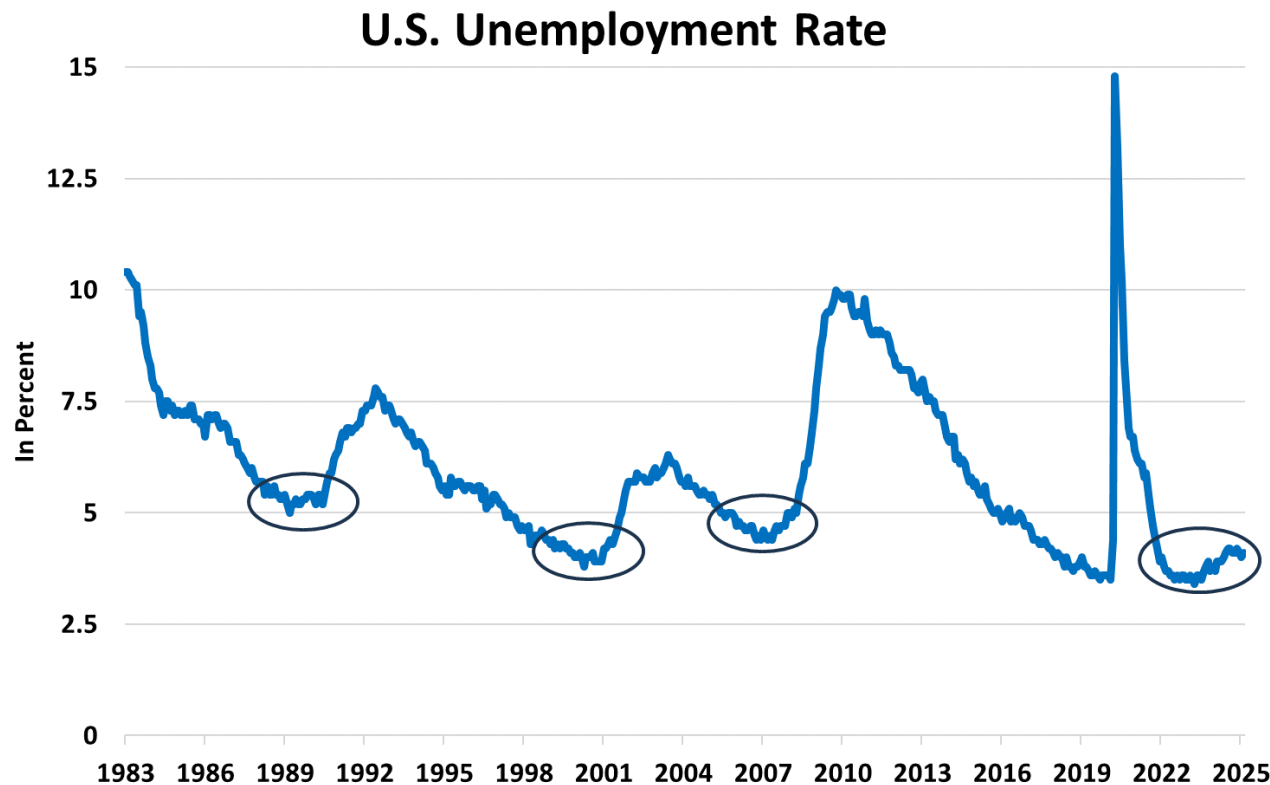
Source: Bloomberg Professional (FDTRMID, CBAROVER, UKBRBASE, EURR002W, BOJDPBAL, RBATCTR, NOBRDEP, SWRATEI, SZLTDEP, SZLTTR, NZOCR)

Latin American Central Banks Have Been Leading Indicators of the Rest of the World's Monetary Policy Since 2020.



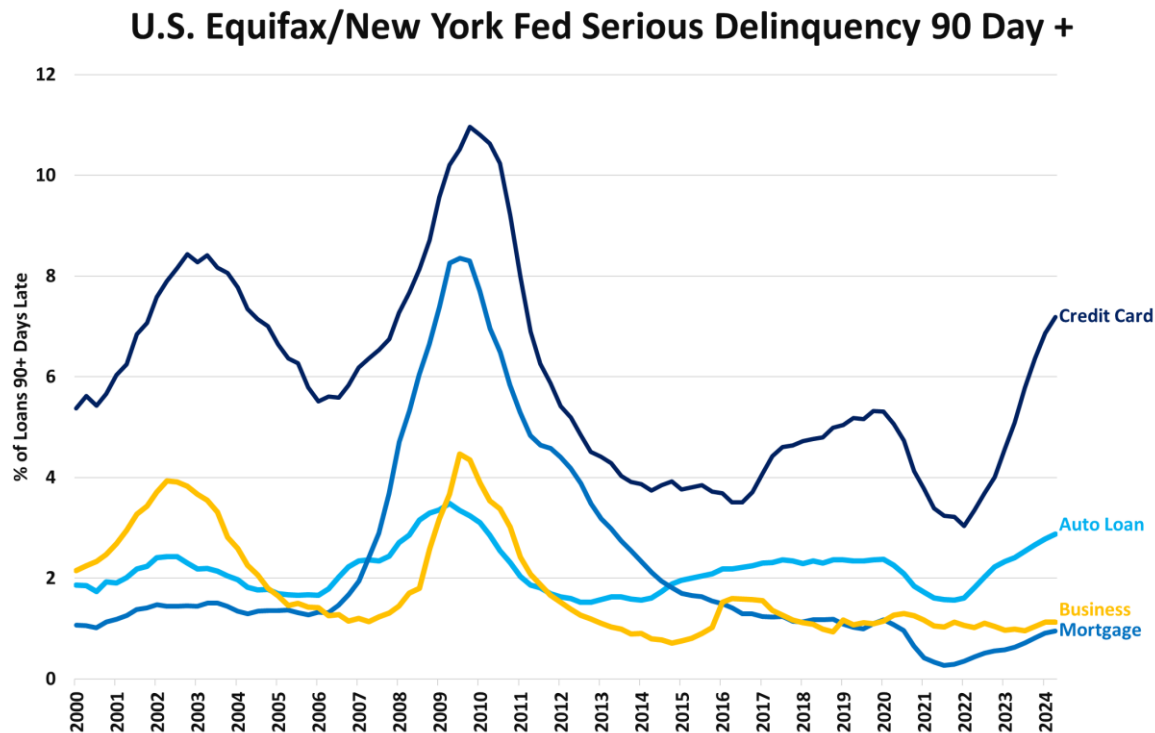
Source: Bloomberg Professional (BZ5TSETA, CHOVCHOV, CORRMIN, MXONBR, FDTRMID)

U.S. Unemployment Is Rising As It Often Does Before A Recession.



Source: Bloomberg Professional (USURTOT)

Defaults on Auto Loan and Credit Cards Has Risen to Their Highest Levels Since 2010/2011.

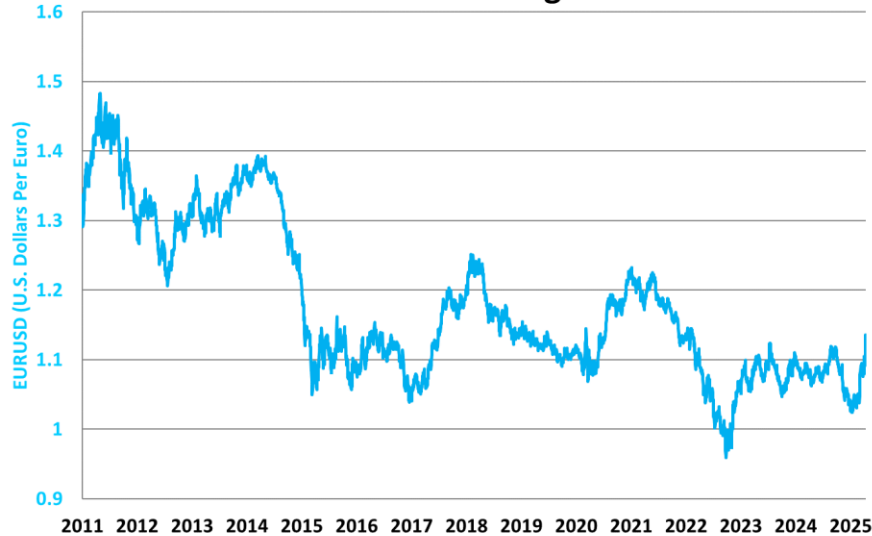


Source: Bloomberg Professional ([USDEBLBC](#), [USEQCCTO](#), [USEQMTMO](#) and [USEQTLTO](#))

Europe's Economics Prospects and Foreign Policy

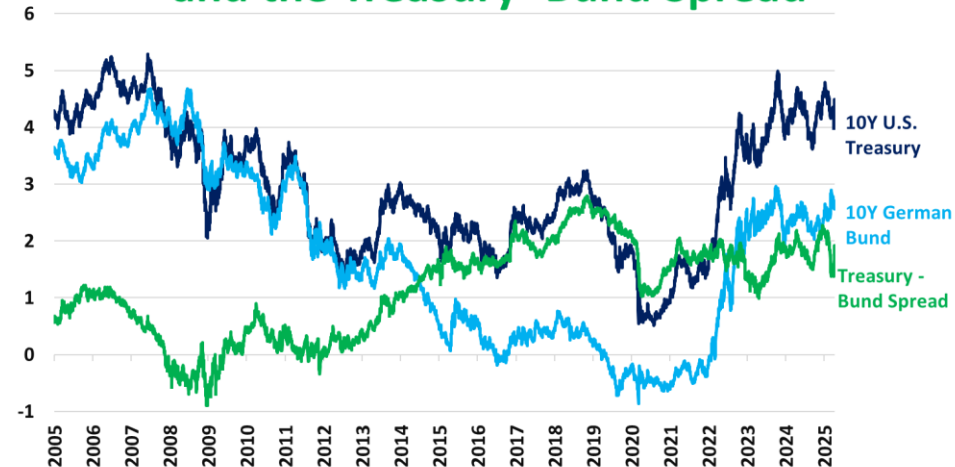
EURUSD rose while the Treasury Bund Spread Widened as China Apparently Sold U.S. Bonds and Reinvested in Europe

EURUSD Exchange Rate



Source: Bloomberg ([EUR](#))

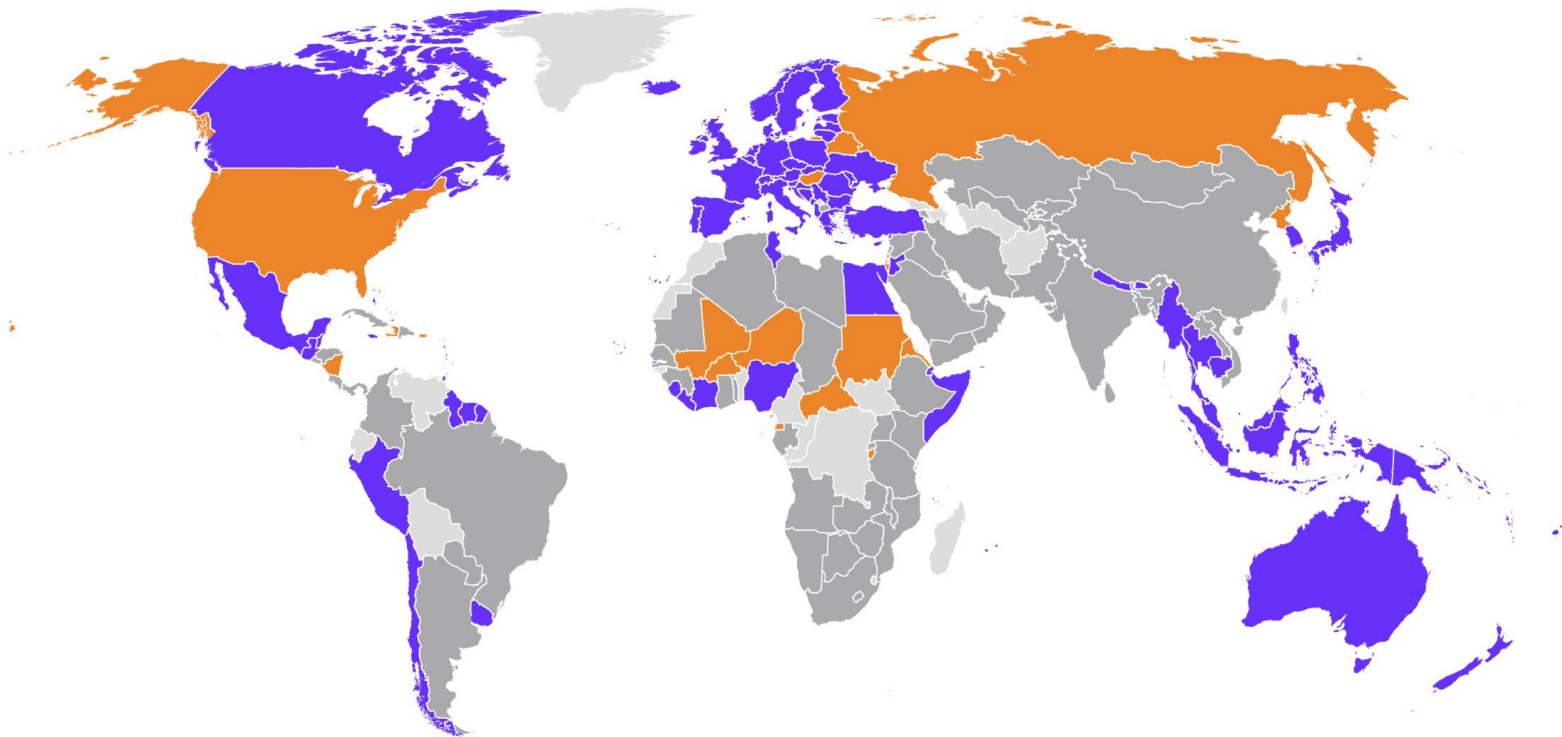
10Y U.S. Treasury, 10Y Bund and the Treasury -Bund Spread



Source: Bloomberg Professional (USGG10YR and GTDEM10Y), CME Economic Research Calculations

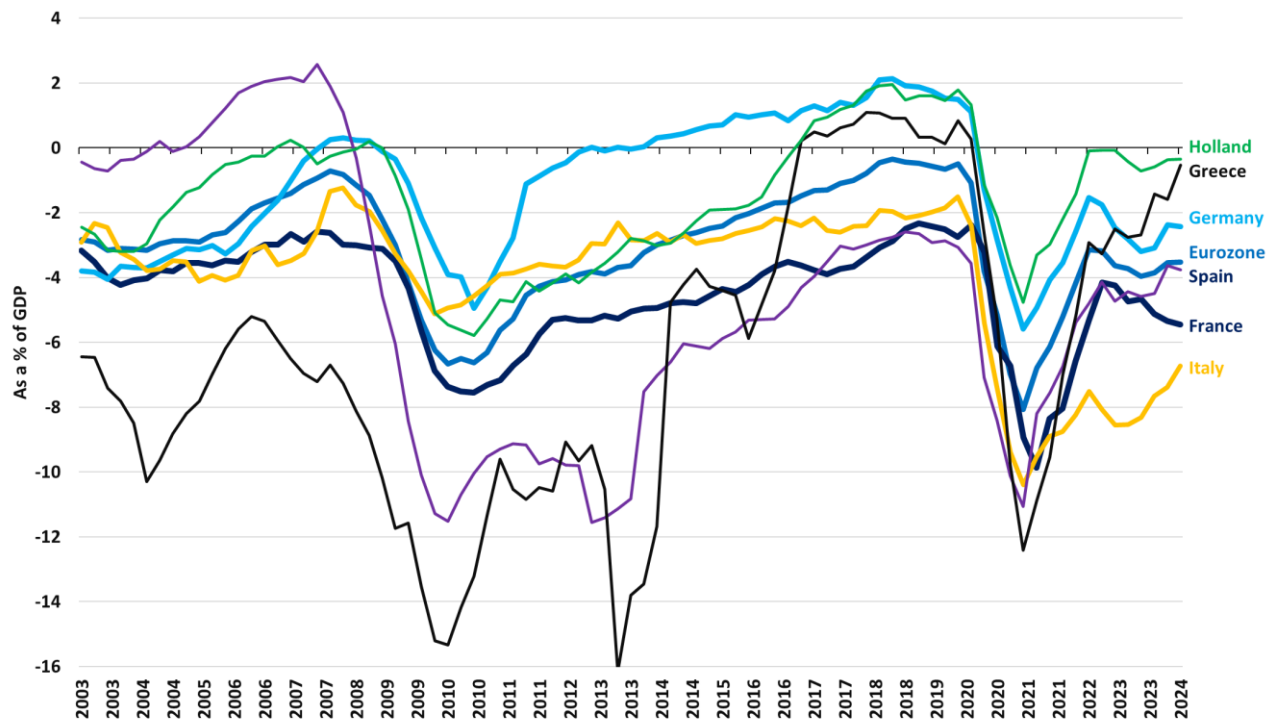
3rd Anniversary Vote On Condemning Russia for Invading Ukraine.

■ In favor (93) ■ Against (18) ■ Abstained (65)



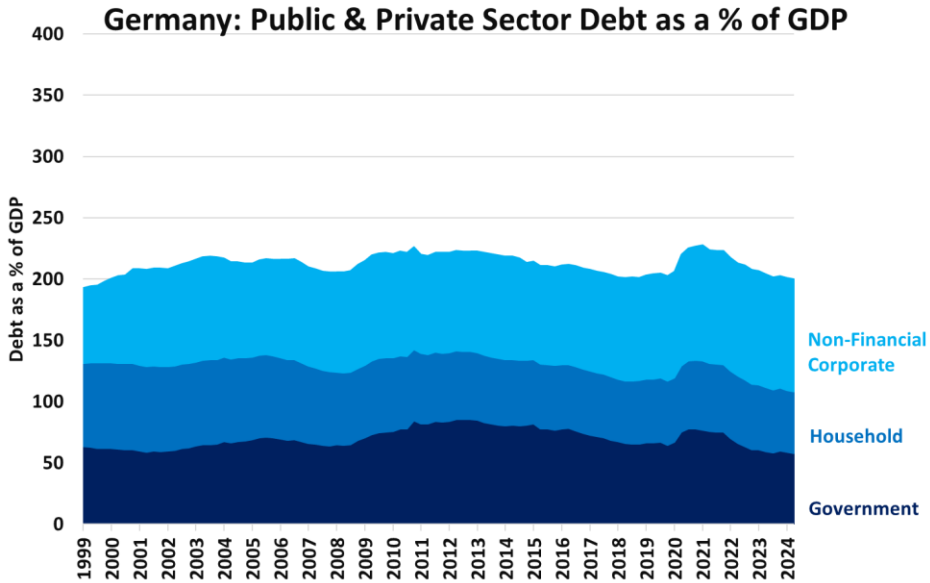
Germany Has Smaller Fiscal Deficits Than Most Other Countries.

Eurozone Budget Surpluses and Deficits

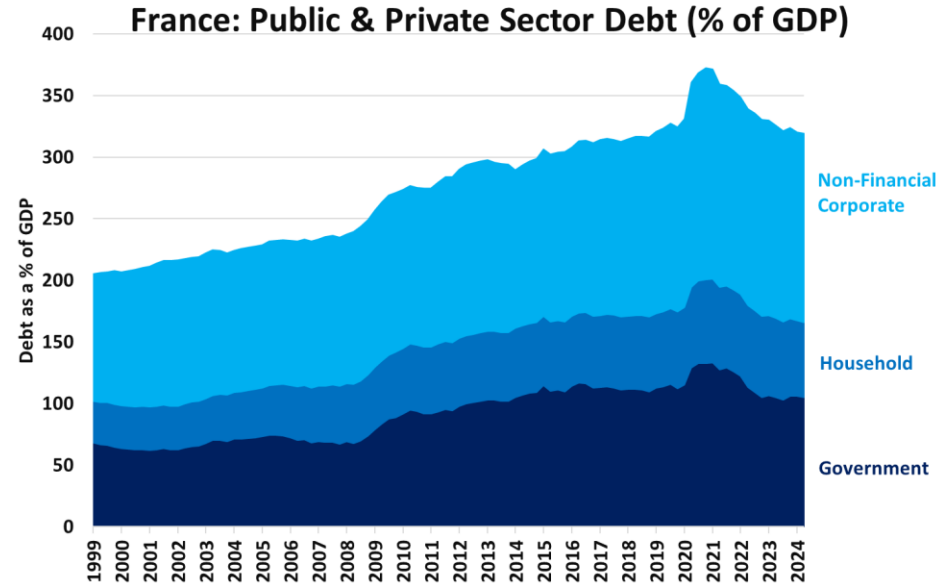


Source: Bloomberg Professional (EHBBEU, EHBBNL, EHBBFR, EHBBDE, EHBBES, EHBBIT, EHBBGR)

Germany Is the One Country With Untapped Borrowing Capacity

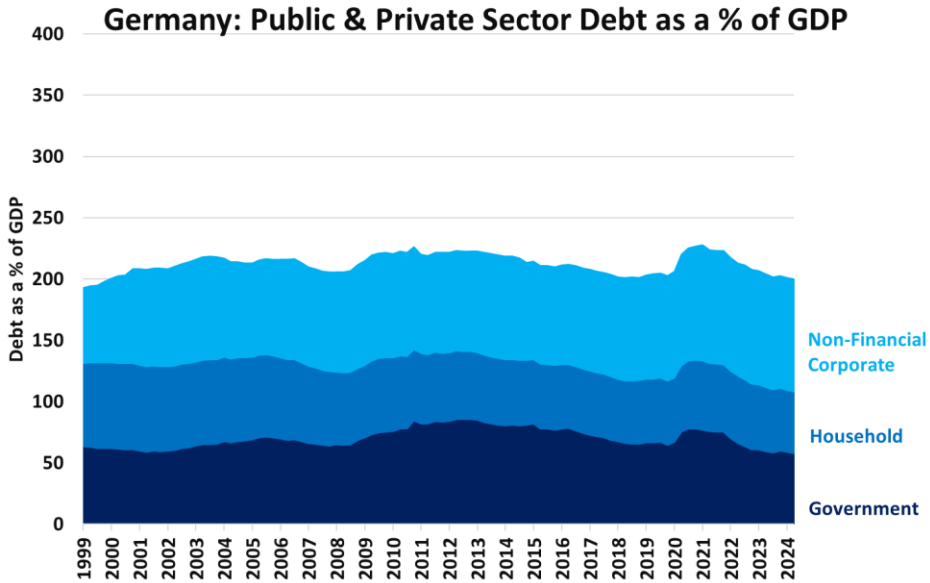


Source: Bank for International Settlements, Total Credit to the Non-Financial Sector Database [Q:DE:G:A:M:770:A, Q:DE:H:A:M:770:A, Q:DE:N:A:M:770:A]

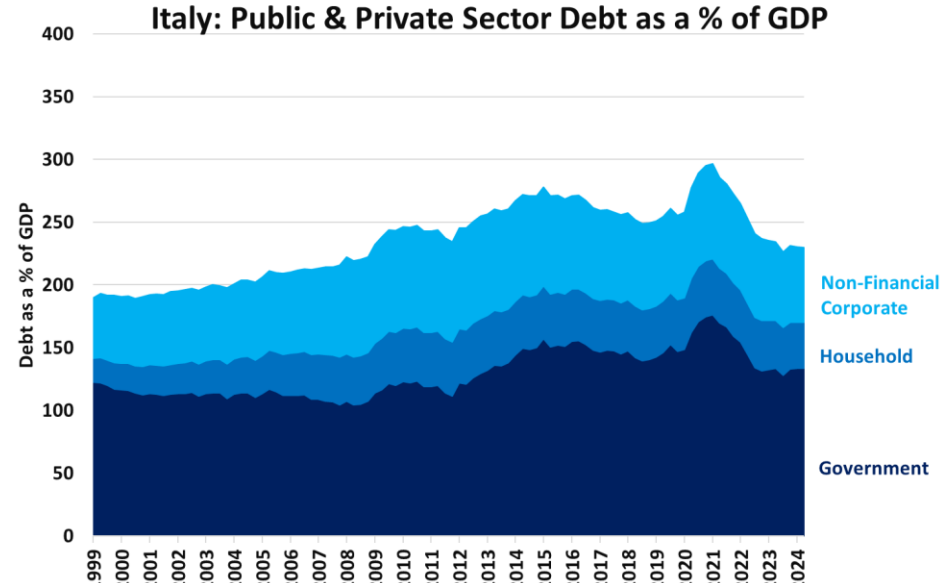


Source: Bank for International Settlements, Total Credit to the Non-Financial Sector Database [Q:FR:G:A:M:770:A, Q:FR:H:A:M:770:A, Q:FR:N:A:M:770:A]

Germany Is the One Country With Untapped Borrowing Capacity



Source: Bank for International Settlements, Total Credit to the Non-Financial Sector Database (Q:DE:G:A:M:770:A, Q:DE:H:A:M:770:A, Q:DE:N:A:M:770:A)



Source: Bank for International Settlements, Total Credit to the Non-Financial Sector Database (Q:IT:G:A:M:770:A, Q:IT:H:A:M:770:A, Q:IT:N:A:M:770:A)

Thank You

