Goldman Sachs | Global Macro Research

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TOP *of* MIND

FOOD, FUEL, AND THE COST-OF-LIVING CRISIS

The recent decline in commodity prices has provided a rare respite for central banks trying to rein in high inflation. But are the energy and food crises afflicting the world actually easing, and what are the implications for global growth, inflation, and political stability? We pit a commodity bull, GS GIR's Jeff Currie, against a bear, economist and investor Gary Shilling. Despite rising recession risk, Currie is resolute: the commodity supercycle will persist given severe underinvestment in supply and likely resilient demand. But Shilling rejects the idea of a coming (or any) commodity supercycle, and sees the run-up as mostly a speculative binge with room to unwind. We dive deep into the two markets in the eye of storm: energy and food. GS GIR's Damien Courvalin makes the case for a near-term rise in oil prices to a new cycle peak. And Cornell's Chris Barrett explains what will (and won't) solve the food crisis. Lastly, Harvard's Meghan O'Sullivan discusses the geopolitical implications, warning that the emerging new energy order sets the stage for significant geopolitical tumult ahead.

"In October 2020, we started arguing that the world was heading for a commodity supercycle akin to the 1970s and the 2000s owing largely to a long period of underinvestment in the old economy."

- Jeff Currie

"I don't see evidence of a commodity supercycle today nor at any point in the last 200 years."

- Gary Shilling

"The emerging new energy order will have significant geopolitical implications...the historically close connection between energy and geopolitics is in for a new—and tumultuous—chapter."

- Meghan O'Sullivan

"The global food crisis isn't a food shortage crisis, but rather a food price crisis."

- Chris Barrett

WHAT'S INSIDE

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Macro news and views

We provide a brief snapshot on the most important economies for the global markets

US

Latest GS proprietary datapoints/major changes in views

- We recently lowered our 2022 Q4/Q4 growth forecast to 0.4% on the back of tighter financial conditions and a further erosion of real income due to firmer inflation.
- We recently raised our Dec 2022/2023/2024 core PCE inflation forecasts to 4.5%/2.6%/2.3% on the back of additional upward pressure in cyclical service categories.

Datapoints/trends we're focused on

- Recession risk; we see a 30% prob of entering a recession in the next year and nearly even odds in the next two years.
- Fed hikes; we expect a 50bp rate hike in Sept and 25bp hikes in each of Nov and Dec, although we see upside risk.

Japan

Latest GS proprietary datapoints/major changes in views

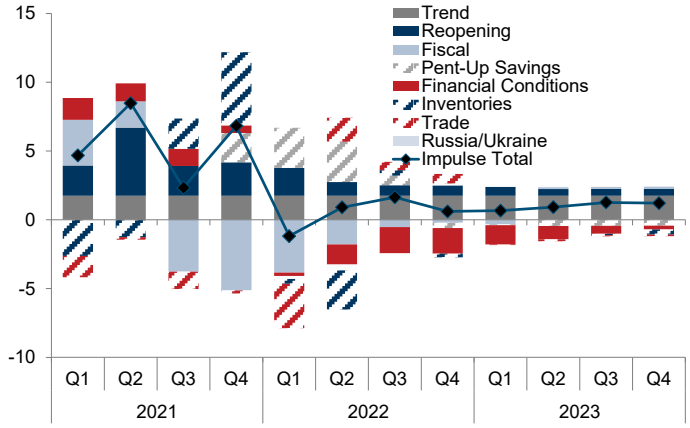
- We lowered our 2Q22 real GDP forecast to 3.2%, primarily due to a sharp drop in net exports in April-June.

Datapoints/trends we're focused on

- Yield curve control, which we expect the BoJ to maintain through the end of Governor Kuroda's term in April 2023.
- Inflation, which we think is unlikely to accelerate to levels on par with those in the US/Europe due to limited scope for the pass-through of production costs and energy price controls.
- Politics; we think the recent Upper House election result could pave the way for PM Kishida to establish a long-term administration given his cabinet's high support rating.

Tighter US financial conditions to weigh on growth

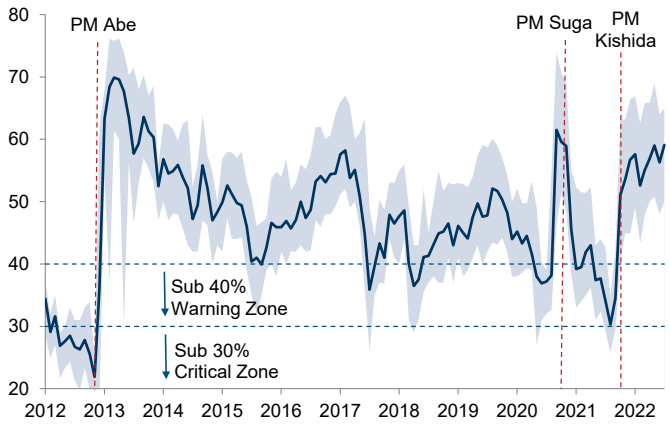
Contribution to real annualized GDP forecast, percentage points



Source: Goldman Sachs GIR.

The Kishida Cabinet's approval rating remains high

%



Source: Real Politics Japan, Goldman Sachs GIR.

Europe

Latest GS proprietary datapoints/major changes in views

- We recently lowered our 3Q/4Q22 EA growth forecasts to -0.1%/-0.2%, and now expect a recession in 2H22 due to sharply weaker incoming activity data, reduced Russian gas supply, and political uncertainty in Italy.
- We expect less ECB tightening (now look for a 25bp hike in Oct vs. 50bp previously) due to our growth downgrade.

Datapoints/trends we're focused on

- ECB anti-fragmentation tool, which could anchor sov credit.
- BoE rate hikes; we expect 50bp hikes in Aug and Sept, and Bank Rate to rise to 2.75% by Dec, given wage growth persistence and inflationary pressures in the UK.

Emerging Markets (EM)

Latest GS proprietary datapoints/major changes in views

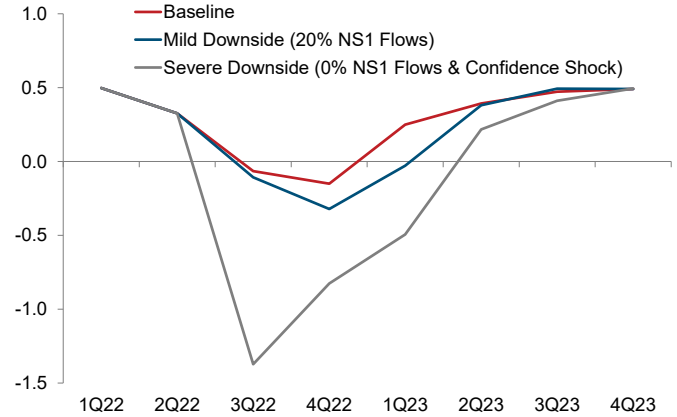
- We lowered our 2022 China growth forecast to 3.3% after a weak Q2 print following recent Covid lockdowns.
- We revised up our terminal rate forecasts across the CEE-4 region on the back of exceptionally high inflation, rising inflation expectations, and weak exchange rates.

Datapoints/trends we're focused on

- China residential property, which we think is too big to fail.
- Food inflation, which has affected EMs particularly hard.
- EM sovereign debt crisis; the number of EM sovereigns in debt distress or default is at historic highs.

A Euro area recession in sight

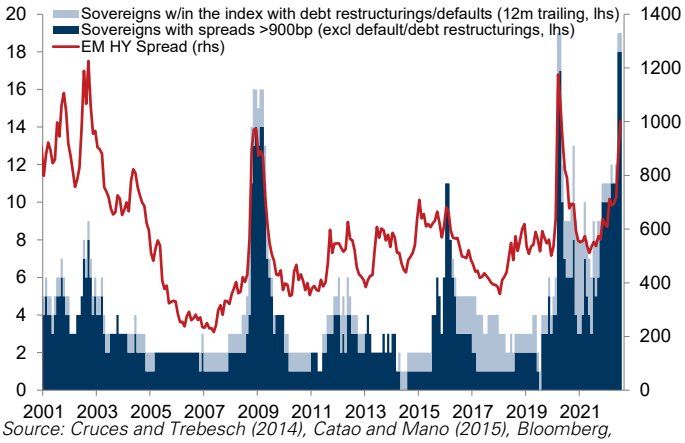
Euro area real GDP growth forecasts, % QoQ



Source: Goldman Sachs GIR.

An emerging EM debt crisis?

Number of sovereigns (lhs), basis points (rhs)



Source: Cruces and Trebesch (2014), Catao and Mano (2015), Bloomberg, Moody's, Datastream, GS GIR (excl. Russia and Belarus from the history).

Food, fuel, and the cost-of-living crisis

Amid a backdrop of slowing global growth as central banks act ever-more aggressively to rein in high inflation, the recent decline in commodity prices that has begun to ease the global cost-of-living crisis has been a rare bright spot. This decline is especially welcome given the tight correlation between gas prices at the pump and inflation expectations, which central banks are monitoring closely for signs of de-anchoring that would require even more forceful action—with potentially recessionary consequences. But even as most commodity prices are off recent peaks, many physical commodity markets remain tight while Europe is facing an acute energy shortage with the curtailment of Russian gas flows that could have knock-on effects across the commodity complex. So are the energy and food crises really resolving? Given their importance for inflation, growth, and even political stability, where commodity prices are heading from here is Top of Mind.

We first speak with Jeff Currie, GS Global Head of Commodities Research, and Gary Shilling, President of A. Gary Shilling & Co., Inc., about the drivers of this year's surge in commodity prices and whether prices have already peaked. Currie has long argued that we're only at the start of a new commodity supercycle---akin to the prolonged periods of high and volatile commodity prices in the 1970s and 2000s—owing to severe underinvestment in commodity supply capacity that has left supply unable to meet rising demand induced by government policies around Redistribution, the Environment, and Deglobalization (RED). And he views claims that the war in Ukraine is largely to blame for the current crisis as spurious, arguing that, if anything, the causality runs the other way.

Shilling, in contrast, rejects the idea of a coming commodity supercycle—and even the existence of commodity supercycles at all—given his estimates that inflation-adjusted commodity prices have generally declined since the mid-1800s. He argues that commodity shortages are almost always short-lived because demand and supply responses to higher prices, as well as human ingenuity, have a track record of overcoming scarcity. And he views this year's run-up in commodity prices as the result of a classic speculative binge that far exceeds what's justified by short-term tightness in fundamentals resulting from pandemic reopening and the war in Ukraine.

It's no surprise, then, that Shilling and Currie disagree on where commodity prices are headed. Shilling believes that they have further to fall due to a looming global economic recession that will dent commodity demand and a rise in commodity supplies in response to recent higher prices. He sees copper prices—a historical bellwether for the global economy—leading the way, but also expects Brent oil prices to fall to $60-80/bbl in the coming months. This contrasts sharply with Currie's view that fuel and food demand will prove relatively resilient even in the event of a recession—as it did in the 1970s---and that this demand resilience on top of supply constraints skews energy and food price risk sharply to the upside near term, while industrial metals, and copper in particular, are well-positioned for medium-term upside. He therefore believes that there's no better time for investors to own commodities, while Shilling believes now is the time to short them.

Given that fuel and food sit at the core of the current crisis—and arguably the inflation and growth outlook—we then dive deeper into both. On the energy side, we turn to Damien Courvalin, GS Head of Energy Commodity Research, who argues that while European natural gas prices are likely to remain extremely high and volatile as Russia curtails supply, oil offers the best risk-reward in the energy complex given that oil inventories are at record-low levels, increased oil supply from OPEC, US shale producers, and elsewhere is likely to be limited, and oil is the cheapest source of energy today. He therefore expects already exceptionally tight physical oil markets to tighten further, driving Brent prices to a new cycle high of $135/bbl in 2H22 and an average of $125/bbl in 2023.

On the food side, we speak with Chris Barrett, International Professor of Agriculture at Cornell University. He explains that the global food crisis isn't about food shortages, but rather food prices, with global wholesale food prices up about 25% yoy, as the cost structure of the global food system has risen sharply alongside the broader energy complex, and as demand for animal products has risen as incomes have grown worldwide. So he doesn't believe that a potential resumption of Ukrainian grains exports will provide much relief, and argues that investing in technologies that increase food production using less land, water, and costly inputs is the only way to solve the global food crisis. Without stepping up to meet this challenge, and soon, he warns that political stability in many developing countries could be undermined—case in point: Sri Lanka.

GS commodity strategist Daniel Sharp echoes these views, arguing that agricultural prices are likely to remain volatile as food's unique place in the carbon cycle leaves it particularly exposed to ongoing decarbonization efforts, crop yield volatility is likely to rise as climate change increases the frequency of extreme weather events, and country conflicts arising from, and contributing to, agricultural scarcity become increasingly common. With all this in mind, GS market strategists Kamakshya Trivedi and Teresa Alves assess the exposure of EM Frontier countries and markets to the food crisis.

More broadly, GS economists Daan Struyven, Yulia Zhestkova, and Christian Schnittker look at what a renewed rise in commodity prices would mean for global growth, inflation, and monetary policy. They find that while the net impact on global growth is likely to be negative, there will be winners—Canada, CEEMEA, and LatAm—as well as losers—the Euro area most prominently, which we now expect to be in technical recession in 2H22, in large part owing to its energy crisis, raising downside risk to the ECB's hiking trajectory.

Finally, we speak with Meghan O'Sullivan, Professor at Harvard University, to understand the geopolitical origins and consequences of the ongoing commodity crisis. She argues that the geopolitical heft of sovereign oil producers is likely to increase rather than decline over the next decade even as the world transitions towards cleaner energy, and warns that the emerging new energy order is likely to usher in a period of significant geopolitical tumult ahead.

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Interview with Jeff Currie

Jeff Currie is Global Head of Commodities Research at Goldman Sachs. Below, he argues that despite rising recession risk, the commodities supercycle is here to stay given historic tightness in physical markets, structural underinvestment in supply, and increased policy-driven demand.

Allison Nathan: What's driven the sharp surge in global energy and food prices this year?

Jeff Currie: At the core of the current crisis is structural underinvestment in commodities supply amid a policy-induced rise in demand. In October 2020, we started arguing that the world was heading for a commodity supercycle akin to the 1970s and the 2000s owing largely to a long period of underinvestment in the "old economy", including industries such as energy and other basic materials, since the Global Financial Crisis (GFC). Superior returns on equity in the "new economy" relative to the old economy led investors to redirect capital toward the Netflixes of the world and away from the Exxons. It's no coincidence that the past two commodity supercycles were also preceded by similar boom-bust periods in the new economy, including the Nifty Fifty in the 1960s and the dot-com bubble of the 1990s. As was the case then, the scale of underinvestment in the old economy has now left us with inadequate supply to weather large shocks. And on the demand side, the pandemic created a severe crisis of inequalities, forcing macro policy globally to focus on social need rather than financial stability. This shift reinforced nascent government policies around Redistribution, the Environment, and Deglobalization—or what we term "RED(lining) demand"—and sharply drove up global commodities demand. So this combination of severe structural supply constraints owing to prolonged underinvestment—which we've coined the "Revenge of the Old Economy"—and policy-driven demand has led to our current precarious position.

Allison Nathan: But wasn't the war in Ukraine a key driver of the sharp move higher in commodity prices?

Jeff Currie: If anything, the causality runs the other way. The chronic underinvestment in supply incentivized President Putin to invade Ukraine in the first place. It was clear as of last summer that Europe was facing an acute energy crisis that left it exceptionally vulnerable to further disruptions, which prompted Putin to begin mounting troops on the border. The conflict has certainly affected a range of commodity markets, most notably grains via the loss of Ukrainian wheat exports, but also more recently natural gas, as Russian flows through the Nord Stream 1 (NS1) pipeline have slowed sharply. That said, the supply of Russian oil on the market is down only modestly relative to its pre-war level, though the decline is unfortunately concentrated in certain critical products and has added to existing global refinery shortages. Despite claims that the war in Ukraine is largely to blame for the current energy and food crises, these problems largely predate the conflict.

Allison Nathan: Even if current supply shortages are deep-seated and structural, wouldn't a global recession put an end to high commodity prices?

Jeff Currie: No. Recessions and demand destruction driven by high prices are merely temporary solutions to high prices. The only long-term solution to the current crisis is investment to de-bottleneck the system, either by increasing new supply or improving productivity through the use of new technologies. The experience of the 1970s recessions is instructive. Throughout the 70s, the economy swung from real growth to real contraction, but nominal GDP and commodities demand kept growing, as, unlike demand for industrial metals, food and fuel demand aren't very cyclical. This is often forgotten because recent downturns that hit travel and fuel consumption particularly hard, including the pandemic recession, the GFC, and September 11th, saw commodity markets collapse. But in the Fed-induced recessions of the early 1970s, global oil and commodity demand held up fairly well. And even in 1973, when sky-high oil prices caused deep economic contractions, food and fuel demand remained relatively resilient.

Given that resilience, it ultimately took one of the largest capex booms on record to slay inflation. While former Fed Chair Paul Volcker is widely credited for solving the inflation problem by raising rates to 20%, he did so in 1979 after a decade-long capex cycle that laid the groundwork for his success by de-bottlenecking oil and metals production capacity. This raises the question of whether former Fed Chair Arthur Burns, who was heavily criticized at the time, may deserve some credit for running the economy hot and facilitating a capex boom that had profoundly positive implications for growth for three decades, including the development of the internet. So, recession-related demand declines won't solve the current crisis; the only way out of this is through increased investment. But a new investment cycle has yet to take root.

Allison Nathan: Won't the current high prices and strong returns in the natural resources sector lead to increased investment, as has been the case in the past?

Jeff Currie: Eventually. But despite the fact that the only assets that have delivered positive YTD returns besides the USD and the RUB are hydrocarbons and carbohydrates, the natural resources sector remains starved of capital. Of the $250tn of AUM in financial markets today, we estimate that net length in commodities has fallen to just $62bn, less than one-twentieth of a percent. And while overall equity AUM has risen since 2008, capital invested in commodity firms has fallen sharply, leaving commodities' share of portfolios down sharply. Speculative positioning in the market is also very light, with investors net short copper and positioning in the oil market not even at its three-year averages. As a result of investors' general wariness, Energy represents around 8-10% of total S&P 500 revenue, but only 3-4% of the S&P 500's market cap.

Why is the sector still so underinvested? Capital allocators give three reasons. First is its history of poor returns. While it seems like a distant memory, oil prices were literally negative only a couple of years ago; losses in the sector were nothing

short of epic. And history suggests that at least a three-year track record of compelling returns is needed to attract sustained inflows. Once that track record is established, it will take time for the industry to absorb the necessary capital. We estimate that the capital deficit today is at least $200bn, and probably higher if accounting for surging operating costs, which necessitate even more working capital to maintain production. So this is going to be a drawn out process. Similar cycles in the 1970s and 2000s took about 12 years—three years to establish a track record of returns, another three to undertake new capex and absorb the cost inflation that naturally follows new investment, and six more to de-bottleneck the system. The second reason investors cite is the sector's high volatility, which creates a volatility trap—the higher the volatility, the lower the incentive to invest, which further increases the volatility. And the third reason, which marks a substantial difference from past cycles, is that policy—whether it be ESG or proposals like a windfall profit tax—is less favorable to capex investment in the industry. In the current environment in which addressing climate change and social need are policy priorities, the price that incentivizes additional investment is far higher than in the past, and still above current levels.

Allison Nathan: So, what should policymakers do to help resolve this crisis?

Jeff Currie: Policymakers need to put in place clear, consistent, and globally coordinated policy that persuades investors that this is a safe place to invest. And the only realistic route to such an outcome, as we've discussed in the past, is by establishing a global price for carbon that would allow investors and analysts to embed these costs in a firm's profitability metrics and allocate capital accordingly. Only governments can correct this problem—and the resulting misallocation of capital—via a carbon price, which leaves energy policy and climate policy inextricably linked. What will it take for governments to do this? Unfortunately, the parallels between today and the 1970s, in which the war on poverty, the war on acid rain, and the Cold War set the stage for a similar period of elevated commodity prices and inflation, are striking. Back then it took an environmental catastrophe—Lake Erie catching on fire in 1969 due to excessive pollution—to spark sufficient outrage to prompt President Nixon's passage of the Clean Air Act. Barring such a crisis event, the impediments to increasing investment and supply will remain high.

Allison Nathan: So where do you see the most upside across the commodity complex from here?

Jeff Currie: Physical markets across most commodities are the tightest ever recorded in nearly 30 years of data. But we see the most upside for fuel and food in the near term given the extent of underinvestment, vulnerability to supply shocks, and demand resilience, which is only reinforced by policies that are subsidizing consumption to temper the cost-of-living crisis and reducing consumers' sensitivity to high prices in the process. Energy in particular is set for high and spiky prices heading into the winter given these factors, record-low inventories, and the likely need for substantial substitution to oil to replace lost natural gas supplies in places like Germany, where they've already resorted to burning coal and woodchips. And agriculture outcomes will be closely tied to energy given the importance of nitrogen and fertilizers in the production process as well as biofuel linkages—higher energy prices increase demand for biofuels, which then puts upward pressure on agriculture prices. Case in point: the Biden Administration's immediate response to gasoline-driven inflationary pressures has been to allow more ethanol to be blended into gasoline, which has further tightened food markets. On top of this, agriculture markets are bearing the brunt of direct effects from climate change, which has dented yields in many places for years.

Further out, metals will also come back into play. Although industrial metals prices have sold off sharply YTD, and we've recently lowered our copper price forecasts on a worsening economic growth outlook and rapid Dollar appreciation, industrial metals sit at the center of the sizable green capex boom we expect to take root next year and estimate could amount to around $16tn in new investment this decade, which is equivalent to the size of China in the 2000s, and investment needs will double to the size of two Chinas in the following decade. No commodity is better positioned for this boom than copper because no element on Earth is a better conductor of electricity, which sits at the heart of the clean energy transition. So, we think energy and agriculture are best positioned for upside today, but metals will be in the future.

Allison Nathan: Won't Dollar strength weigh on the broader commodity complex beyond copper?

Jeff Currie: No; we like to say that oil prices drive the Dollar, but the Dollar drives metals prices. The reason why is oil costs are mostly fixed and priced in Dollars while metals costs are mostly variable and priced in local currencies. So a strong Dollar lowers the cost of producing metals, which acts as a headwind to metals prices in Dollar terms, but doesn't do much to the cost of producing oil. More broadly, it's sometimes argued that a strong Dollar will dent commodities demand from Emerging Market (EM) economies that now face a higher cost to service their Dollar-denominated debt. But many commodity-producing EM economies have built large Dollar reserves, providing a substantial buffer to any refinancing shock.

Allison Nathan: With all this in mind, how should investors be positioned from here?

Jeff Currie: We recommend owning a diversified index of commodities. The case for doing so is as strong as ever not only tactically, as commodities are currently oversold on recession concerns, but also strategically because they remain the best hedge against inflation, valuation risk, and the energy transition, all of which will be the central themes of the coming decade. For millennia, hydrocarbons and carbohydrates have powered societies, and they're core to any inflation hedge. The energy transition will be very expensive precisely because carbon is everywhere. So, we're sticking to our bullish commodities view until we have clear, consistent, and globally coordinated policy around both energy and climate policy that hastens the investment the industry desperately needs today.

Interview with Gary Shilling

Gary Shilling is President of A. Gary Shilling & Co., Inc. Previously, he worked at the Federal Reserve Bank of San Francisco, Merrill Lynch, and Standard Oil Co. Below, he argues that commodity prices are likely to decline further as the global economy heads into recession, supply responds to high prices, and speculators exit long positions, and therefore recommends that investors short commodities, and especially copper.

The views stated herein are those of the interviewee and do not necessarily reflect those of Goldman Sachs.

Allison Nathan: Was the run-up in energy and broader commodity prices this year justified? Now that prices are off their peaks, where do you see them heading from here?

Gary Shilling: The surge in commodity prices this year has been the result of a classic speculative binge; fundamentals initially drove prices higher as economies reopened after the pandemic, but speculation then pushed prices well above what fundamentals could justify.

Commodity prices have likely already peaked as both demand and supply forces look set to further depress prices from here. On the demand side, North America and Europe are both likely heading for recession. This will also affect China—which is already struggling with ongoing Covid outbreaks and lockdowns—through a decline in demand for manufactured goods exports, which in turn will weigh on commodity demand given that much of the oil, copper, and iron ore China imports from countries like Brazil, Chile, and Argentina is used in manufactured goods for export.

Dollar strength, which will likely continue in a global recession due to its safe-haven properties, will also dent demand for commodities from both developed and developing countries. Of the 45 major commodities traded globally, only three aren't traded in Dollars—wool, in Australian dollars, amber, in Russian rubles, and palm oil, in Malaysian ringgit. That makes it very difficult for countries whose currencies are weakening against the Dollar to continue buying commodities. At its peak in early June, Brent crude oil was up 59% YTD in Dollar terms, but 66% in Chinese yuan and 85% in Japanese yen. Many developing economies, in particular, don't have meaningful currency reserves to help shield them from higher Dollar-priced commodities, and they're running current account deficits that will need to be financed through a reduction in currency reserves.

On the supply side, the current high prices are inducing more production, which should in turn lead to lower prices over time. High prices are the best fertilizer for agricultural commodities and for commodities more broadly. Farmers in the US and Canada are planting fence-row to fence-row in response to high grain prices. Copper supply is also coming out of the woodwork, which, along with a demand slowdown, is leading the International Copper Study Group to forecast a 328,000-metric-ton surplus for refined copper this year after a 475,000-metric-ton deficit in 2021. And once prices start to fall for one commodity, they often decline for others since speculators tend to be on the same side of the same commodity trades at the same time. For example, speculators who are taking big losses in wheat positions might be forced to sell their copper holdings to conserve capital. So commodity prices are broadly set to decline further due both to fundamentals and a decline in speculative long positions.

Allison Nathan: Some observers have argued that investors haven't touched commodities because of their history of poor returns, the ESG stigma, and high and self-reinforcing volatility, and so the surge in prices can't be blamed on them. What's your response to that?

Gary Shilling: While it's true that many institutional and individual investors traditionally haven't wanted to go anywhere near commodities, many investors piled into them this year as everything else—equities, bonds, foreign currencies, etc.—was collapsing. They saw commodities as their last chance to be long, taking a TINA—or "There is No Alternative"—approach. As a result, $21bn flowed into commodity ETFs this year through April, in contrast to the $63bn in outflows in the first four months of last year, according to Morningstar. Although that's small in the grand scheme of the market, there are clearly investors out there speculating on commodities.

Allison Nathan: Isn't it premature to be bearish on commodities at this point given that physical markets remain extraordinarily tight—as evidenced by very low inventories and high physical premiums—and most major economies are still growing, albeit at a slower pace?

Gary Shilling: Being too early on a bearish call is always a possibility, but it's amazing how fast conditions can change, and the economy is showing real signs of weakness. US retailers have chopped orders in response to excessive inventories after incorrectly anticipating blowout holiday sales at the end of last year. Around a quarter of the 1.6% decline in real GDP in the first quarter of this year was due to slowing inventory accumulation, and that figure was even bigger in the second quarter as the goods from Asia that were unloaded at West Coast ports moved inland. The backlog of vessels in the ports of Long Beach and Los Angeles fell from 110 in January to around 30 in July. The second quarter contraction in real GDP marks two consecutive quarters of negative growth, which constitutes a recession, some believe. Of course, nobody rings a bell when a recession begins, and it will take a while for the National Bureau of Economic Research, the official business-cycle arbiter, to declare a recession after it starts, but the US economy is likely in or close to recession. And the recent decline in copper futures—which is a great bellwether for the health of the global economy due to copper's use in almost anything that's manufactured, from computers to appliances to machinery to cars—only provides further evidence for this.

Allison Nathan: Even if major economies are in or on the brink of recession, what would make this time different from the 1970s, which saw commodity demand remain resilient despite economic downturns?

Gary Shilling: Two things drove the economy, and indirectly commodity demand, in the 1970s—the war in Vietnam and President Johnson's Great Society programs. But similar such drivers don't exist today to generate sustained inflationary pressures. The rise of globalization since the 1970s has also resulted in commodity-intensive manufacturing moving to countries with cheaper labor, initially China and now increasingly places like Vietnam, which helps keep down the average cost of production. So it's a very different world today than it was in the 1970s and one less conducive to sustained high commodity demand and prices.

Allison Nathan: While a recession could help ease commodity demand, won't prolonged underinvestment in supply eventually lead to the resumption of a commodity supercycle, akin to the 1970s and the 2000s?

Gary Shilling: I don't see evidence of a commodity supercycle today nor at any point in the last 200 years. Except for brief rises during wars and the 1970s oil embargoes, commodity prices, as measured by the Commodity Research Bureau (CRB) Index, have fallen by a staggering 83% since the mid-1800s when adjusted for inflation. A significant portion of that decline took place in the latter half of the 1800s, a period of huge commodity demand on the back of the American Industrial Revolution and the forced industrialization of Japan. That's because, again, supplies quickly respond to high prices.

Anyone making the argument that commodity shortages will prove lasting is swimming upstream given that human ingenuity beats shortages any day. I remember when serious economists thought that the telecommunications business was going to come to a grinding halt because there wasn't enough copper in the Earth's surface to make all the necessary wires. But then came along fiber optics made from silicon, the second most abundant element on Earth. Technological innovations will also enable supplies to be used more efficiently, reducing the need to produce as much in the future. Conventional gasoline engines convert only 10-30% of the energy stored in gasoline to power at the wheel, while the comparable figure for electric vehicles is over 70%.

Allison Nathan: So you don't buy into the view that the increased use of electric vehicles is bullish for copper over the medium term given that it is the best conductor of electricity on Earth?

Gary Shilling: No, because even if we are increasingly reliant on copper, which remains to be seen, copper supply would likely rise alongside demand. Higher prices have already spurred the recovery of copper from mine tailings—the waste left over once copper is extracted from ore—which is becoming increasingly possible through leaching processes. Recycling will also continue to play an important role in increasing supply. Around 30% of the copper used globally over the last decade was sourced through recycling, and that share is likely to remain high going forward given that copper is 100% recyclable. Increasing supply of the other metals necessary for the development of electric batteries—rare earth metals, nickel, cadmium, and lithium—may be more politically fraught given that China and Russia hold some of the largest reserves, but I see no reason that production won't respond to higher prices as it has in the past.

Allison Nathan: Even if you expect high prices will induce supply responses for metals and agriculture, isn't the new focus on ESG and the clean energy transition a reason to expect a more muted energy supply response to higher prices today than in the past?

Gary Shilling: To quote Sir John Templeton, the most dangerous words in the English language are "this time it's different." I see no reason why energy production won't respond to higher prices, as it has in the past. While some may argue that the focus on climate change and ESG will prevent a supply response, in the over 50 years that I've been in this business, "this time it's different" has never been a good investment philosophy.

Allison Nathan: So how far do you expect prices for oil, industrial metals, and agricultural commodities to fall?

Gary Shilling: Brent oil prices could decline to $60-80/bbl, but they likely won't fall further than that, as OPEC members have an interest in keeping prices relatively high and investors and lenders have encouraged US frackers, who used to abide by the mantra "drill, baby, drill," to focus on profitability, paying dividends, and repurchasing stock, which is likely to temper their supply response. So I don't see oil prices in a free-fall per se, but do still see scope for substantial declines from here.

Copper, on the other hand, has no cartel on either the demand or supply side that can disrupt fundamental economic forces, leaving prices to reflect the coming global recession. Copper futures, which are already down 30% from their early March peak, could fall further to $2-2.5/pound. And while bad weather can affect agricultural commodities, the weather in the US looks fairly favorable for crops so far, and that, combined with the supply response to higher prices, should push agricultural commodity prices lower even as the war in Ukraine continues to loom over markets.

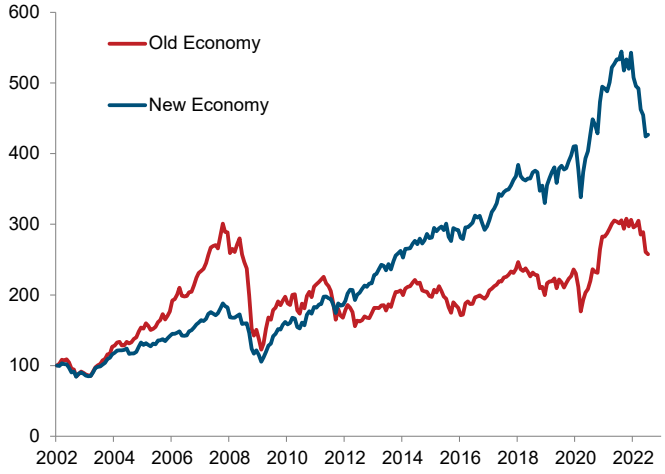
Allison Nathan: With that in mind, how should investors be positioned from here?

Gary Shilling: In the aggressive portfolios we manage, we're short copper futures, given it's the commodity most closely tied to the recession we expect and is less exposed to cartels and geopolitical factors. More broadly, investors wanting to engage with commodities should generally short them, in order to take advantage of the further declines in commodity prices that are likely on the horizon.

Commodity underinvestment in pics

Commodities have delivered relatively poor returns…

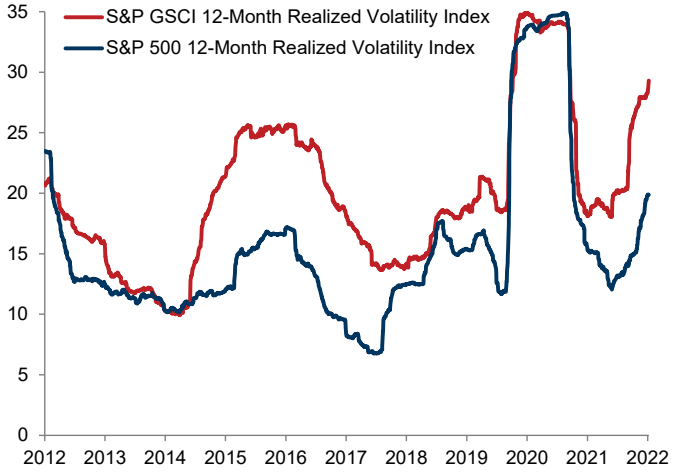
Cumulative equity returns by sector, 2002 = 100



Note: Old economy includes energy and metals; new economy includes tech.
Source: Reuters, Goldman Sachs GIR.

…and have been relatively volatile over the past decade

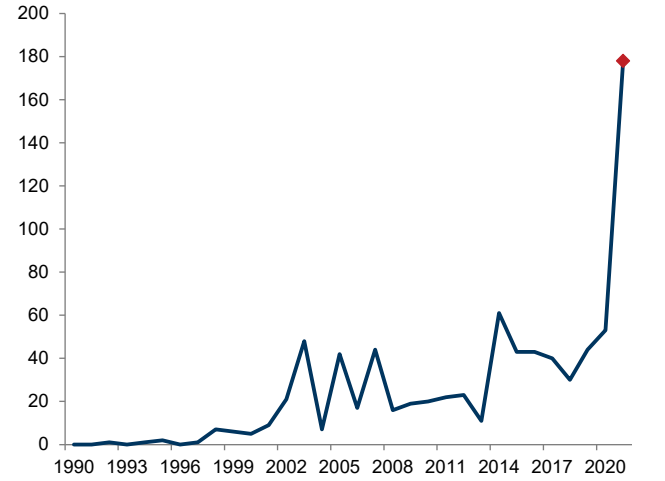
Annualized standard deviation of daily price returns by index



Source: S&P Global, Goldman Sachs GIR.

Global ESG regulations have grown significantly…

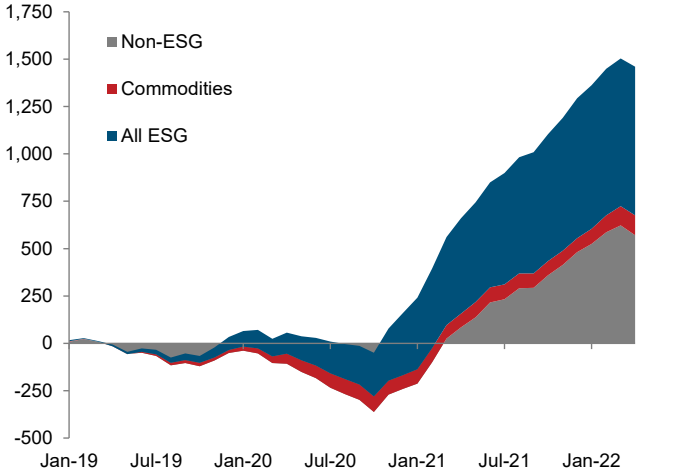
Global sustainable finance regulations, issued or in progress



Source: PRI, Goldman Sachs GIR.

…and ESG has cannibalized flows into commodities

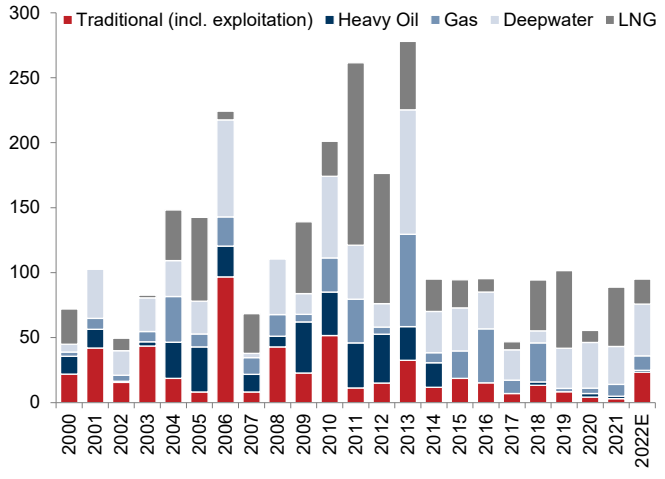
Cumulative change in Morningstar equity fund flows, $bn



Source: Morningstar, Goldman Sachs GIR.

The result: nearly a decade of capex underinvestment…

Top Projects capex sanctioned in oil by year, $bn

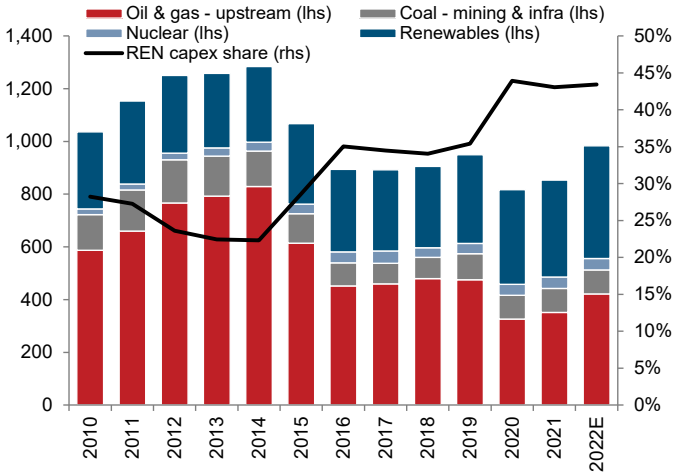


Source: Company data, Goldman Sachs GIR.

Special thanks to Daniel Sharp and Bepul Shahab for charts.

…with an increased share of renewables in capex spending

Energy supply capex by fuel and power supply source ($bn, lhs), clean energy (renewables and biofuels) as % of total (rhs)

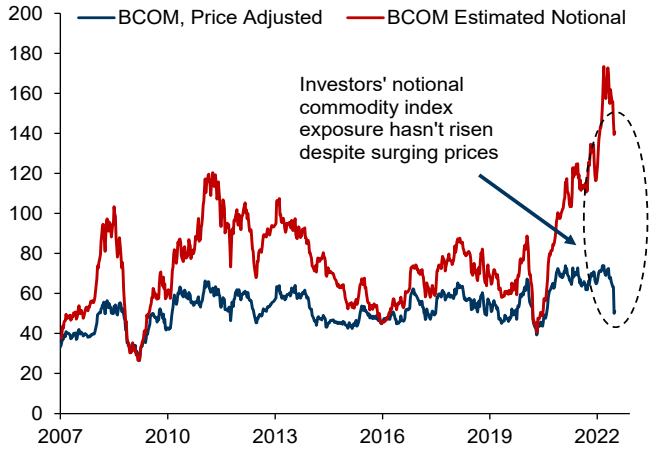


Source: IEA WEI, Goldman Sachs GIR.

Markets: still cautious on commodities

Commodity index investors have reduced exposure even as commodities have outperformed

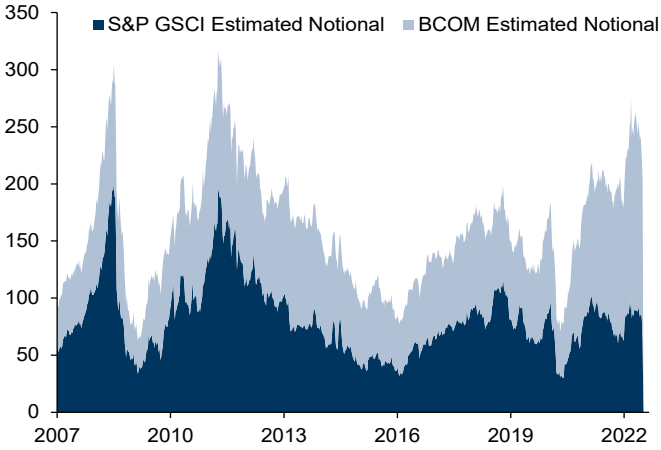
GSe, BCOM notional AUM and price-adjusted AUM, $bn



Source: Bloomberg, Goldman Sachs GIR.

Total commodity index exposure is ~$200bn vs. ~127tn and ~$124tn for global fixed income and equity markets

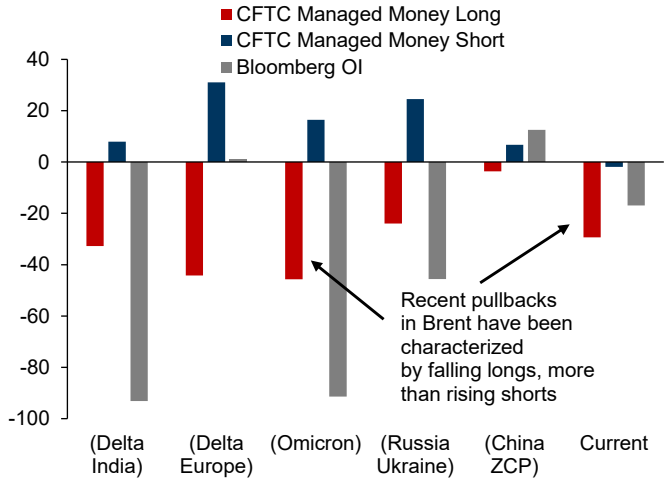
S&P GSCI and BCOM notional AUM, $bn



Note: Global capital markets capitalization data as of 2021.
Source: SIFMA, Bloomberg, Goldman Sachs GIR.

Recent oil price pullbacks have been driven by declining investor length not additional shorts

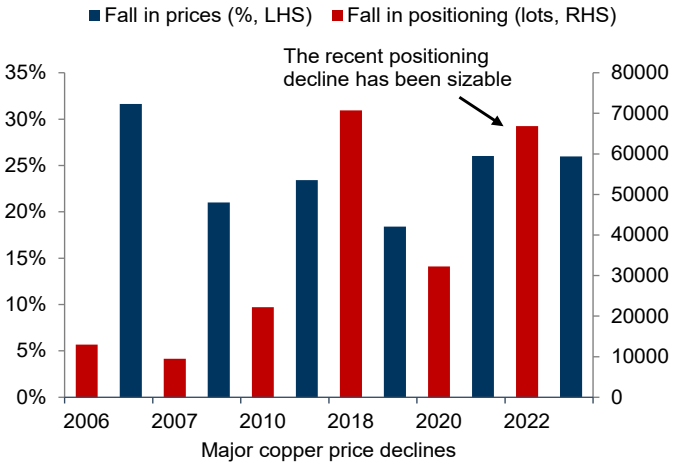
Average wow change in contracts, thousands



Source: Bloomberg, Goldman Sachs GIR.

The positioning adjustment in copper is now close to a record, suggesting limited further near-term downside

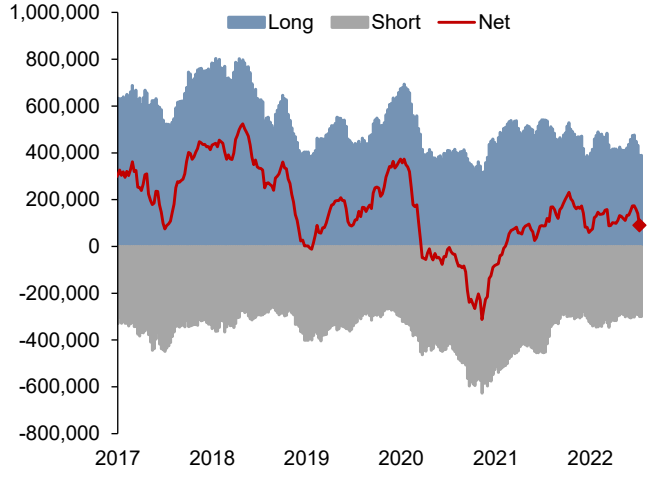
Price decline (%, lhs), fall in positioning (lots, rhs)



Source: Bloomberg, Wind, Goldman Sachs GIR.

Positioning in oil is below its 3-year moving average

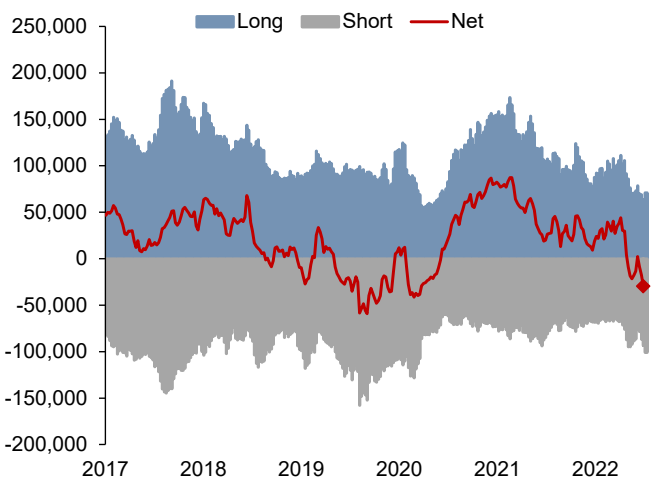
Net investor positioning in Brent crude oil, lots



Source: CFTC, Goldman Sachs GIR.

And investors are net short copper

Net investor positioning in copper, lots



Source: CFTC, Goldman Sachs GIR.

Special thanks to Daniel Sharp for charts.

Commodity crisis: the macro impact

Daan Struyven, Yulia Zhestkova, and Christian Schnittker detail the implications of the commodity supercycle for global growth, inflation, and monetary policy

The surge in energy and food prices over the past year has fueled much of the steep rise in global inflation and contributed to a rapid and fairly synchronized global monetary policy hiking cycle. But the impact of sharply higher commodity prices has varied across regions, with important implications for global growth, inflation and the monetary policy outlook.

Indeed, the rise in food prices has driven the commodity shock in Emerging Markets (EMs), while the impact of rising energy prices has been far more acute in Developed Markets (DMs). And, within DMs, the Euro area looks poised for a recession in 2H22 as a result of sharply higher energy prices following the reduction of Russian gas flows to the continent, which also suggests that the ECB's policy path may be less steep than the Fed's through the coming hiking cycle.

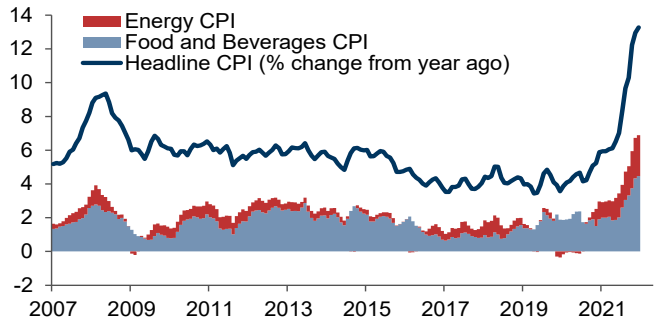
EM food shock, DM energy shock

The commodity shock has been felt most acutely at the grocery store in EM and at the pump in DM. The food contribution to CPI in EMs excluding China of 4.5pp is nearly two times the contribution from energy. This largely reflects the fact that EM consumers spend a more substantial portion of their income on food, which is reflected in the far higher food CPI weights in EMs of 20-45% versus a 12% average in DMs. By region, the food contribution to inflation is generally larger in CEEMEA and LatAm than in Asia and DMs. In contrast, the current energy contribution to average DM headline inflation of 3pp is about 3x as large as the contribution from food.

That said, the food contribution is now also rising quickly in Asia and remains the highest on record in DMs since 1996. By country, the food contribution is particularly large in Turkey, Romania, and Russia, reflecting both macro factors and the effects of Russia's invasion of Ukraine. And although the S&P GSCI Agriculture & Livestock Index has fallen by ~20% since mid-May, the conflict and potential spillovers from high fertilizer prices (partly due to high gas prices) to next year's crops pose upside risk to food and headline inflation, especially in EMs.

Food shock in EMs

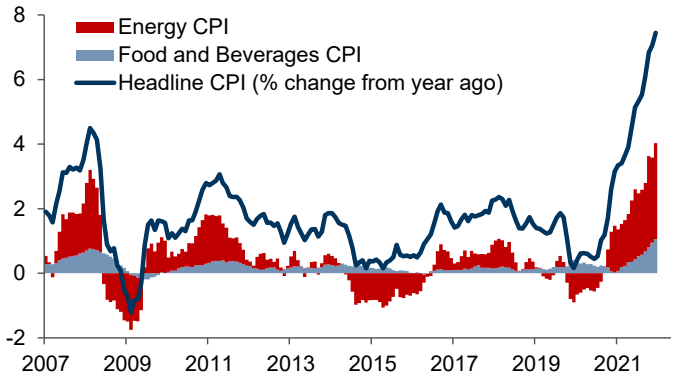
Contribution of food/energy inflation to EM ex-China yoy headline CPI, pp



Source: Haver Analytics, Goldman Sachs GIR.

Energy shock in DMs

Contribution of food/energy inflation to DM yoy headline CPI, pp



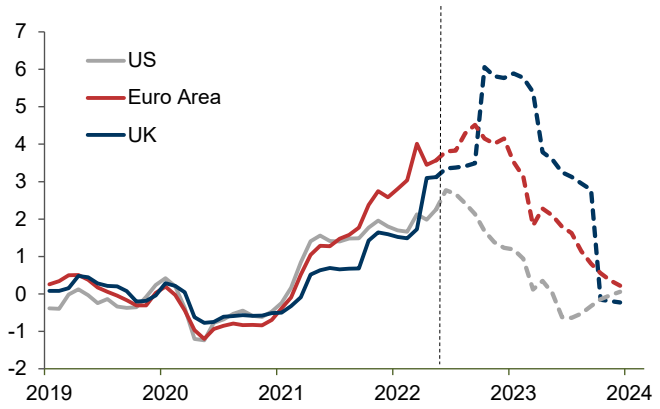
Source: Haver Analytics, Goldman Sachs GIR.

A Europe-centric energy shock

At the same time, the energy crisis is squarely centered in Europe given its dependence on Russian natural gas supplies, which have declined sharply in recent weeks. We expect the contribution of energy to headline inflation to exceed 4.5pp this fall in the Euro area and approach 6pp in the UK.[1]

A bigger energy shock in Europe

Energy contribution to headline inflation, pp



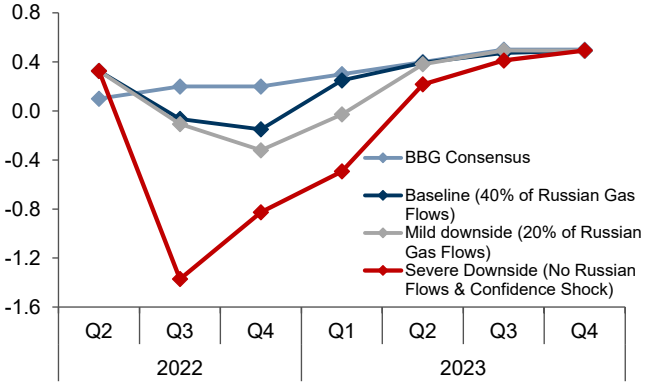
Source: Haver Analytics, Goldman Sachs GIR.

Assuming that gas flows from Russia through Nord Stream 1 (NS1) eventually settle around 40% of capacity, which is our baseline, industrial demand destruction induced by higher energy prices would subtract over 1.5% from Euro area GDP relative to a scenario where NS1 operates at full capacity. That said, the risk of further disruptions remains significant, especially after the recent announcement of additional cuts to NS1 flows to 20% of capacity, and a complete loss of gas supply remains a live possibility. We estimate that such a stop would push the Euro area into a sharp recession (with a cumulative decline in real GDP of 1.2%–2.7%) with particularly large contractions in Germany (1.7%–3.2%) and Italy (2.6%–4.1%).

[1] The effect is more back-loaded in the UK because the energy price cap gets updated only every six months for now, with the next likely 42% rise coming in October.

Europe: a recession is coming

Euro area real growth scenarios, % qoq non-annualized

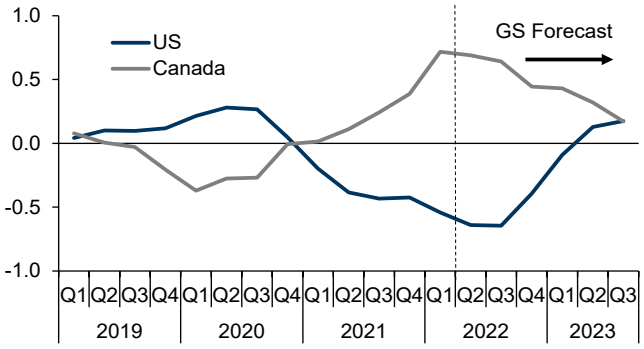


Source: Bloomberg, Goldman Sachs GIR.

Beyond Europe, the expected growth effects from energy prices are smaller in most other regions, including North America. North American gas prices have risen less dramatically and the positive growth effect via energy capex substantially offsets the negative effect on consumer spending via lower real income in the US and Canada. Under our 4Q22 Brent forecast of $130/bbl, we estimate a negative oil price effect on 2022 Q4/Q4 growth of 0.5pp in the US and a 0.5pp boost in Canada. But we expect the negative oil price effect on US growth to diminish this winter, consistent with our view that US real disposable income picks up in 2H (while a growing drag from tight financial conditions keeps growth below trend).

Less dramatic energy growth effects in North America

Impact on quarterly annualized GDP growth from real oil prices, pp



Source: Haver Analytics, Goldman Sachs GIR.

While the net impact on higher commodity prices on global growth is negative, especially when triggered by negative supply shocks, there are winners and losers. The positive oil growth impulse in Canada, for example, is one reason for our hawkish BoC call for a 4.25% terminal rate. In CEEMEA, LatAm, and New Zealand rising food prices improve the terms of trade which may (partly) offset the negative growth effect from higher food inflation via real household income spending.

Hawkish implications so far

The negative growth effect of rising commodity prices in net commodity-importing countries may offset the hawkish implications of higher inflation in theory. But, in practice, low interest rates to start this year, very high inflation, and labor market tightness in many economies imply that policymakers have so far primarily focused on combatting the inflation effect.

The increases in salient food and energy prices have fueled policymakers' concerns about a potential de-anchoring of inflation expectations and rising wage pressures. This is especially true in several EMs where policymakers' track record in keeping expectations anchored is more limited. And, even in the US, the sharp rise in gasoline prices through June boosted the preliminary June reading of UMich consumer inflation expectations, which contributed to the Fed's 75bp hike in June.

Looking ahead, the net impact of commodity prices on monetary policy is less clear because of uncertainty about the direction of commodity prices themselves as well as rising global recession fears. For instance, while our commodity strategists project a rebound, the recent decline in US gasoline prices suggests that the energy impulse to sequential US headline inflation will be negative in coming months. The recent fall in US gasoline and oil prices likely also contributed to the 0.3pp decline in the preliminary July 5-10 year UMich inflation reading, which is one reason why the Fed delivered a 75bp hike at the July FOMC meeting rather than opting to accelerate the near-term hiking pace.

In Europe, the prospect of a complete stop of Russian gas flows (and sovereign debt risks) skews the risk to the pace of ECB hiking and our 1.5% terminal rate forecast to the downside beyond the September meeting, where we still expect a 50bp hike following last week's 50bp liftoff. However, the net impact on ECB policy will likely depend on the demand and confidence implications of such a scenario, any boost to wages and inflation expectations, and the ECB's reaction function. While inflation expectations are better anchored than in the 1970s, recent ECB statements focus more on inflation than on growth, and the ECB also hiked in 2008 and 2011 in the face of higher commodity prices and weakening growth.

In the UK, very high headline inflation paired with rapidly rising inflation expectations also drives our forecast for an acceleration in the BoE hiking cycle with 50bp hikes in August and September. Finally, risks of a global slowdown and/or related declines in commodity prices, such as copper in the case of Chile, is causing EM exchange rates to sell off, adding to EM rate pressures, including in LatAm and the CEE, and increasing the impetus for further rate hikes.

A critical macro driver

The ongoing spike in global energy and food prices will remain a critical macro driver in coming quarters. Of most immediate concern, the prospect for further disruptions to Russian gas supplies to the Euro area has left recession as our base case there and increased the prospect of a shallower ECB hiking cycle. But it's also raised the risk that EM central banks could lose control of inflation expectations, leading to more restrictive monetary policy as global growth already looks set to slow.

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Interview with Meghan O'Sullivan

Meghan O'Sullivan is the Jeane Kirkpatrick Professor of the Practice of International Affairs at Harvard University's Kennedy School. She is also a Partner at Macro Advisory Partners and the North American Chair of the Trilateral Commission. Meghan was Deputy National Security Advisor for Iraq and Afghanistan under President George W. Bush. Below, she argues that a new energy order, featuring a larger role for governments and sovereign oil producers, is coming, setting the stage for a period of geopolitical tumult ahead.

The views stated herein are those of the interviewee and do not necessarily reflect those of Goldman Sachs.

Allison Nathan: How does the current energy crisis differ from that of the 1970s?

Meghan O'Sullivan: Some clear parallels exist—as in the 1970s, we're once again experiencing a geopolitical disruption of energy supplies that's significantly weighing on the global economy and risks ushering in a period of stagflation and crisis in the developing world. But this crisis is unique in two important, and more concerning, ways. First, the crisis in the 1970s was a global *oil* crisis, but today the world is facing its first global *energy* crisis, in that it involves not just oil, but also natural gas, coal, and potentially low-enriched uranium. And second, this crisis is happening in the context of a climate crisis, which means that some of the responses employed in the 1970s, such as significantly increasing the use of coal, are much less acceptable today. But this crisis is also different in some less concerning ways. Global oil markets are much more liquid today, and many institutions grew out of the 1970s crisis that are helping to manage volatility and strengthen global coordination. So, in some respects the world is in better shape than it could be to face a crisis of the current magnitude.

Allison Nathan: Is this energy crisis largely the result of Russia's invasion of Ukraine?

Meghan O'Sullivan: Russia's invasion of Ukraine is a dominant trigger of the crisis given Russia is one of the largest global suppliers of many energy commodities, and particularly of natural gas to Europe, but it's definitely not the only one. In many respects, the current crisis can also be attributed to the yawning gap between the world's ambitions to move away from fossil fuels and its actions to actually do so. Years of poor returns and increased climate pressures have reduced investment in oil and gas, resulting in limited supplies even as demand for these commodities has continued to grow. And while investment in clean energy has grown significantly, the world has still invested only about a third of what is needed to meet its climate goals. This chasm between energy investment and energy demand put the world in a precarious position even before President Putin decided to take advantage of the vulnerabilities these gaps created.

Allison Nathan: How likely is Putin to continue taking advantage of these vulnerabilities, for example by shutting off Russian gas flows to Europe over the coming months?

Meghan O'Sullivan: Putin clearly calculated that Europe's reliance on Russian energy would help inoculate him from a strong European reaction to Russia's invasion of Ukraine in his overall quest to recast the European security order. And in some respects, he was right—thus far, Europe hasn't severed its energy ties with Russia, and Russia continues to rake in enormous energy revenues that are effectively funding its war. Moreover, Putin has crimped the volume of natural gas Russia is sending to Europe, cranking it up and down in an effort to keep Europe guessing about his intentions and sow discord among Europeans and between Europe and North America. Nevertheless, Europe has been jolted out of its dependence on Russian energy and is making big changes to lessen its dependence. The question will be whether Europe will remain sufficiently united and resolute in the coming winter and not allow Russia to gain geopolitical advantages in an effort to ease what undoubtedly will be significant economic pain. This will not be easy, and it remains to be seen how this will play out.

Allison Nathan: So is Russia's geopolitical heft, afforded to it in part by its abundant natural resources, likely to weaken, especially given the transition to cleaner energy?

Meghan O'Sullivan: Russia has become a bit of a unique case. Its ability to wield geopolitical leverage on account of its energy position will now be circumscribed not only by the dynamics of the energy transition, but also by the fierce determination of the US and many parts of Europe to marginalize Russia as an international power. However, one might ask a similar question about other traditional oil producers: how will the energy transition influence their geopolitical positions? And there is a lot to learn from the current crisis with Russia, which has underscored how—at least in the decades of transition—the move to net zero emissions will empower sovereign oil producers before they constrain them. This is because oil will remain a part of the global energy mix, even in a net zero scenario where the world has met it climate goals. As demand for oil declines—which is not yet happening—high-cost producers will be squeezed out and low-cost producers like those in the Gulf will produce more and more of the smaller pie. As a result, they will likely have more geopolitical heft, not less. This is one reason why President Biden recently traveled to Saudi Arabia to start to repair US-Saudi relations.

Allison Nathan: Even as large energy producers like the Gulf states become more geopolitically important, do they have the ability to move the needle on the current crisis?

Meghan O'Sullivan: The ability for these states to translate their energy situation into geopolitical influence will depend on the circumstances. Sometimes, like today, they will have the ability to exacerbate a crisis, but not huge capacity to ameliorate it. Today, Saudi Arabia and the UAE in particular have some ability to help ease what could be a coming oil crunch when the

European sanctions on Russian oil go into effect in early December. But their influence will be limited by the limited nature of how much spare oil production capacity they have right now. These countries were in a much better position to help calm oil markets when the Obama Administration was leading the effort to isolate Iran with sanctions a decade ago. Back then, the Saudis could commit to backfilling whatever shortages were created by the removal of Iranian oil from global markets. We also need to keep in mind that there's a diminishing utility to spare capacity—the more that it is used, the less calming on markets it is, as markets become unnerved by the depletion of stocks to weather future crises.

Allison Nathan: Do you see any prospects for an Iran deal that could return Iranian oil barrels to the market?

Meghan O'Sullivan: I'm much less optimistic about the prospect of an Iran deal than I was several months ago when the Biden Administration appeared more willing to make a concession to Iran on the designation of the Islamic Revolutionary Guard Corps as a terrorist entity. Domestic politics—and likely the president's own distaste for doing this—left the talks in stalemate. While no party on either side is eager for an open crisis, it's difficult to believe any durable deal is on the horizon given the developments of the last couple of months, and Tehran's position toward coming clean of troubling matters in particular. Iran is on the path to a nuclear weapon, probably whether or not a new agreement is reached in the short term. So, while some market watchers are holding out hope for more supply from Iran, I would dampen their expectations. In fact, looking at the next 12 months, I see it at least as or more likely that sanctions could be tightened in response to a breakdown than it is that sanctions are eased.

Allison Nathan: Can countries like China and India take up the slack from Russian energy that Europe will no longer import, and what are the geopolitical implications?

Meghan O'Sullivan: China and India's ability to absorb more Russian gas is extremely limited in the short term because most of the gas Europe imports from Russia is delivered through pipelines, which aren't connected to the pipelines that deliver gas to Asia. The fungible nature of oil makes it a different story, and China and India have significantly increased their imports of Russian oil. The EU has committed to a ban on seaborne imports of Russian crude oil that will go into effect in early December. China and India's ability to take up that slack will partially depend on how aggressively the EU enforces its ban on insuring ships transporting Russian oil. There are currently ambitious efforts to devise a "price cap" on Russian oil and to modify the shipping ban only to refer to oil not sold under it in the hopes that this arrangement can keep Russian oil flowing to tight markets but prevent Russia from making too much revenue. I'm not optimistic this will solve more problems than it will create.

There are important geopolitical implications regardless of the outcome of these efforts, particularly in relation to the Russia-China relationship; stronger energy ties between the two countries will reinforce a partnership that has shifted from a very transactional to a strategic one over the last decade. But as much as Presidents Xi and Putin like to present the Russia-China relationship as one of equals, the reality is that it's deeply imbalanced, and will become more so as energy ties between the two countries strengthen, making the relationship potentially more unstable.

Allison Nathan: How will the energy crisis to affect the political/geopolitical situation in developing countries?

Meghan O'Sullivan: A very scary cocktail of high energy and food prices and high inflation is emerging across the Emerging Market (EM) complex. We should anticipate the events in Sri Lanka to be replicated across the developing world in the next year, introducing much greater geopolitical risk.

Allison Nathan: Will all of these developments shift the role of government in energy markets?

Meghan O'Sullivan: Yes. The world is grappling with two simultaneous crises—an energy security crisis and a climate crisis, which are often in tension with one another. Left to its own devices, the market is very unlikely to solve both of these crises simultaneously and under current time pressures. Doing so will require governments to be more active in several areas. First, they will need to play a greater role in ensuring greater energy security. Markets are good at solving for the cheapest, most efficient outcome, but that's not always the most energy-secure outcome. For instance, Lithuania's earlier efforts to build an LNG terminal would have never happened without the government, because relying on Russian piped gas would always be cheaper. But today, that terminal has made Lithuania much more energy secure. Such government involvement will also be needed the ensure adequate and secure supplies of critical minerals needed for a successful energy transition, such as lithium, nickel, cobalt, and graphite. Given that China plays a dominant role in many of these supply chains, governments will need to incentivize more production and processing of these minerals elsewhere to stave off a potential geopolitical crisis.

Governments will also need to ensure that today's energy needs are met without undermining tomorrow's energy transition. The world needs more investment in oil and natural gas in the near and medium term, but it is equally important that those investments don't jeopardize a cleaner energy future. Governments may need to devise a new category of "transition" assets, which encourage the private sector to make these investments, but reap adequate returns before their normal commercial life. Finally, governments will need to act to spur a faster energy transition, including by putting a price on carbon.

Allison Nathan: Given all that, how will the new energy order transform the global geopolitical landscape?

Meghan O'Sullivan: The emerging new energy order will have significant geopolitical implications. The energy transition is not just about substituting one form of energy for another. It's about overhauling the entire global energy system—changing how we generate, use, transport, and store energy. This amounts to remaking the backbone of the global economy, and the world is trying to do that in the span of a few short decades. Doing so will be highly disruptive, generating new risks that governments, businesses, and other institutions will have to navigate. The historically close connection between energy and geopolitics is in for a new—and tumultuous—chapter.

Interview with Damien Courvalin

Damien Courvalin is head of Energy within Commodities Research at Goldman Sachs. Below, he argues that the ongoing global energy crisis driven by record tight supply won't be resolved by an economic slowdown, which suggests oil prices have more room to rise in 2H22 and 2023.

Allison Nathan: Given their sharp decline from June highs, have energy prices already peaked?

Damien Courvalin: No. The world is still facing a generalized energy shortage that spans the entire energy complex—from oil to natural gas and even to coal—due to both demand and supply factors that are unlikely to ease in the coming months. Energy demand rebounded sharply coming out of the worst phase of the pandemic and has recently reached record-highs as mobility has increased and people are traveling again. At the same time, significant underinvestment in energy supply owing to historically poor returns and ESG considerations has left the market ill-equipped to weather such a large demand recovery. As a result, the global oil market has sustained a deficit since June 2020—which is the longest stretch of quarterly deficits on record—and global oil inventories are at record-lows. OPEC's spare production capacity is at its lowest level since the first Gulf War in the early 1990s. And the only excess refining capacity in the world is in China, which continues to pursue a policy of restricting refined product exports to ensure lower prices domestically. Meanwhile, Europe still faces a substantial risk of natural gas shortages this winter even as Russian gas flows through the Nord Stream 1 (NS1) pipeline have recently returned to around 20% of capacity, and the degree of tightness in the global coal market is unprecedented. From a fundamental perspective, we have rarely—if ever—seen such a dire setup across energy markets as we do today, which suggests significant upside risk to prices.

Allison Nathan: Even if physical fundamentals are tight, didn't speculators push up prices beyond what fundamentals justified, and so the recent price declines are just unwinding speculative froth, with more to come?

Damien Courvalin: If anything, it's the opposite. The recent run-up is actually notable for the absence of investor participation, especially relative to 2008 or 2018, as evidenced by the fact that physical prices are trading at a historically high premium to futures prices. Financial players don't trade physical commodities, so it's hard to argue that a risk premium is embedded in commodity futures today. This lack of investor participation is likely exacerbating underinvestment in the complex because cheaper prices further out the oil futures curve limit energy producers' incentive to undertake new projects. That's a critical difference between today and 2008, when an upward sloping forward curve spurred an investment cycle that ultimately pushed prices sharply lower by the middle of the 2010s. On top of that, the recent high price volatility has significantly reduced investors' ability to participate in the energy markets. And while positioning data suggests that investors were never particularly long oil in the run-up this year, right now it points to them being as bearish as during the second Covid wave in late 2020. So investors are—if anything—weighing on commodity prices rather than propping them up even as Brent crude oil remains around $100/bbl.

Allison Nathan: Won't fundamentals soften—and prices continue to fall—in the near term as growth slows further in 2H22, especially given rising recession risk?

Damien Courvalin: A recession could help bring demand back in line with supply, but many macro indicators suggest this recession isn't here yet. So global oil demand is still rising, and oil demand growth in the West has, in fact, been outperforming its long-run relationship with GDP, by around 70%, driven by the Covid reopening. The rebound in Chinese demand from the 2Q22 lockdowns has also been stronger than expected, and this demand strength is likely to persist as China continues to pursue stimulative policies to shore up its economy in the run-up to this fall's 20th Party Congress, with international flights just restarting. Against this still-strong demand backdrop, the recent decline in oil prices from the June peak is equivalent to stimulating global oil demand by more than 1mb/d, which is unsustainable given that the market is already in deficit and has very little inventory to close the gap between demand and supply. Unlike equity markets, commodities are physical markets that must clear today's demand-supply mismatch, and higher prices are still needed to resolve the current shortages. This leaves oil price risk substantially skewed to the upside in the near term even as recession risk looms.

Allison Nathan: But couldn't supply dynamics improve in the near term, which would ease the current shortages without prices having to rise further?

Damien Courvalin: No. We don't expect much near-term relief from the supply side. Despite the resilience of Russian exports and the release of Strategic Petroleum Reserves (SPR) in the wake of Russia's invasion of Ukraine, more supply has been lost from recent disruptions in places like Libya than has been gained elsewhere. And the supply outlook is even more challenging given the European embargo set to take effect at the end of the year, which will halt Russian oil flows to Europe and make it more difficult for Russia to redirect its export barrels—on the order of 4.5mb/d—to Asia. Beyond Russia, OPEC has localized spare capacity in Saudi Arabia, the UAE, and Kuwait that amounts to roughly 1.5mb/d, but President Biden's recent trip to the Middle East didn't result in a strong commitment from Saudi Arabia to increase production, and any ramp-up would likely take time given a dearth of drilling in the region. And even if OPEC were to call on spare capacity, depleting the capacity buffer that guards against future shocks would eventually necessitate higher prices in itself, because, in the absence of spare production capacity, inventories need to rise, and the only way to achieve that is via higher prices. That's the core issue for the oil market today—both inventories and spare production capacity, the two lines of defense against future shocks, are extremely low. So, drawing on the limited existing supply is only a stopgap measure that doesn't resolve the underlying issue of

insufficient investment in new supply to support economic growth in coming years.

Allison Nathan: But couldn't additional SPR releases, a possible deal with Iran, or the proposed price cap on Russian oil exports provide some relief?

Damien Courvalin: None of these looks particularly promising. First, while around 1,300mb remain in SPRs globally, releasing barrels from these reserves will only alleviate shortages in the near term, and drawing them down further would leave us vulnerable to additional shocks without creating the right price signals to incentivize investment. Second, on Iran, we assume that an eventual deal will allow for increased Iranian exports by next summer to the tune of roughly 1mb/d, but a near-term deal looks unlikely. Iran has already reached high uranium enrichment levels, and is increasingly sending its exports to Russia and China. Biden's rhetoric has also become more hawkish lately, mentioning the possibility of a military intervention in Iran for the first time during his recent trip to the Middle East. Third, the idea of a price cap on Russian crude exports risks potential Russian retaliation. Every European sanction so far has been met with diminishing gas exports from Russia, and there's no reason to think this time would be any different. That would have the exact opposite effect on energy prices from what the price cap is intended to achieve.

Allison Nathan: Won't US shale production come to the rescue as it did during the 2000s supercycle, when a massive ramp-up in short-cycle shale supply resulted in a substantial supply glut?

Damien Courvalin: US shale producers are responding to higher prices, but the increase in supply will likely be far more muted than in the past—adding roughly 1.5mb/d of new supply by the end of 2023 versus 9.1mb/d over 2011-2019. Shale producers are facing the same logistical and inflationary headwinds as everyone else. In some parts of the sector—like fracking and completion—utilization rates are already 97%, which limits the room to increase production over the next 18 months. The sector's responsiveness to high prices is also lower given changes in corporate behavior after a period of aggressive investment funded by substantial debt issuance from 2016 to 2019 that never translated into profits. Today, investors and lenders are demanding more discipline from shale producers, who, in turn, are now far more focused on profitability and returning cash to shareholders, which we estimate has reduced the sector's elasticity to prices by about a quarter relative to five years ago. This all means there won't be the same shale supply response at even $100/barrel oil as there was with $60/barrel oil in the past.

Allison Nathan: How high could oil prices climb near term?

Damien Courvalin: We expect ongoing deficits to continue to tighten physical markets, sending Brent prices to a peak of $135/bbl in 2H22—a new high for this cycle—before falling modestly to an average of $125/bbl in 2023. And we think the modest relief we've seen in retail prices at the pump will prove short-lived. Throughout this rally, retail gasoline and diesel prices have far outperformed crude oil prices with, for example, US gasoline prices averaging an estimated $165/bbl in June versus $120/bbl for Brent. This unprecedented gap between retail and benchmark crude oil prices was driven by a combination of sharply rising European natural gas prices, which have made refining more expensive, and, as I mentioned, insufficient refining capacity globally. Refining requires burning natural gas to heat up oil, and because European refineries are forced to buy the world's most expensive natural gas amid the war in Ukraine, that sets a higher cost base for the entire global refining industry; if the world demands that European refiners run, then global gasoline prices will have to overcome the cost basis of European refiners, or everyone would just send their gasoline supplies to Europe, creating shortages elsewhere. At the same time, refinery utilization is running at record-highs given a lack of investment in new capacity. For decades now, the industry has avoided adding new refining capacity given environmental considerations, and it's clear that as the world transitions away from fossil fuels, refineries will be among the first stranded assets, which reduces the incentive to expand current capacity. So, we expect the wedge between benchmark and pump prices to persist, unfortunately setting up for exceptionally high retail prices later this summer.

Allison Nathan: How far could prices fall if a recession hits sooner or more severely than we expect, OPEC agrees to larger-than-expected supply increases when it meets next week, and the current pain at the pump substantially hastens the shift to electric vehicles (EVs)?

Damien Courvalin: Even in such scenarios, we would still expect Brent prices to average around $95/bbl in 2023—far above the levels during past downturns—given the exceptionally low level of oil inventories, diminished excess production capacity, and underlying support for demand from the ongoing Covid recovery. Again, the key difference from past downturns is that today investors are positioned as if oil is going to $40/bbl and producers are spending as if oil is well below $100/bbl; the reverse was true in 2008. And while consumers are increasingly motivated to switch to EVs and investment is pouring into those technologies, they haven't yet reached scale, and the costs associated with them have risen dramatically, so we don't foresee meaningful EV adoption until at least the end of the decade. EVs are just not positioned to help stave off the tightness in oil markets we expect in the coming years—let alone the coming months.

Allison Nathan: So should investors go long oil, or is there better risk/reward elsewhere in the energy complex?

Damien Courvalin: European gas markets have the most explosive potential from a fundamental and price perspective given the prospect of significant shortages in Europe this winter, especially in the event Russian gas flows stop altogether, which remains a real risk. Natural gas scarcity could also lead to substantial substitution into coal, and with nobody building out coal capacity because they expect demand for it to eventually fall, that could result in large coal price spikes. But government price caps on natural gas in Europe would limit the price upside, and coal remains a difficult commodity for investors to gain exposure to. All that said, oil remains the cheapest source of energy today, setting it up to benefit from substitution dynamics in the coming months. So, in the wake of the recent selloff, we believe oil offers the best risk/reward in the energy complex today.

The costs of a disrupted carbon cycle

Daniel Sharp argues that volatile food prices are increasingly structural, as food is caught between conflict, carbon, and climate change

In a year that has seen the world's largest wheat exporter invade the world's 4th largest, a record 42.5% of the US under drought conditions, and the sharpest input cost growth for corn since 1975, agricultural volatility has risen sharply. While this year's volatility has been exceptional, it is increasingly likely to occur again. As climate change forces farmers to adapt to extreme weather, the security of supply of key inputs—from fuel to fertilizer—will be challenged by carbon scarcity and conflict. Although such forces are unlikely to act as a true Malthusian check on society, innovation and investment induced by higher average prices will be required to create the technology necessary to overcome them. These themes will likely loom large over grains markets until a run of favorable weather, a widespread rollout of adaptive technologies, or a shift in agricultural supply chain policies emerge.

The carbon cycle dictates agriculture's volatility

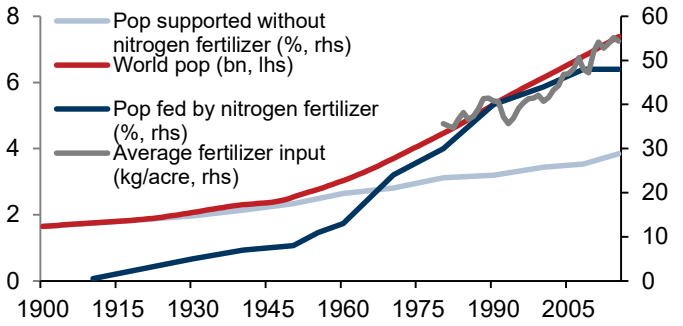
We have often said that carbon is the best hedge against physical inflation, as we believe that the process of decarbonization is one of the driving forces behind the commodity supercycle. Agriculture has unique exposure to decarbonization and climate change given its ties to the carbon cycle. For millennia, society was fed and fueled by short-cycle organic carbon found in crops, wood, and charcoal. Industrial development was limited by the low energy density of short-cycle carbon, and only accelerated with the introduction of long-cycle carbon, first in the form of coal, and then oil and natural gas during the Industrial Revolution. The rapid exploitation of long-cycle carbon precipitated a surge in development, population, and emissions. This surge was partly driven by the use of long-cycle carbon to accelerate the short-cycle carbon process, via the production of fertilizer from natural gas and the advent of mechanized agriculture using fossil fuels.

Together, this led global grains production to rise from 630m mt in 1960 to 2.84bn mt in 2022 alongside a boom in the global population from 3bn to 7.8bn. Without the additional energy and nutrients supplied by fossil fuels, global agricultural production could not have reached its current level. And the Food and Agriculture Organization of the UN (FAO) estimates that the global demand for food will rise 60% by 2050. This is in part due to a shift in consumption patterns toward food with a higher protein intensity, increasing the inputs required for each calorie in a meal. But fossil fuel emissions have also led to an atmospheric carbon surplus that is destabilizing the climate and increasing the frequency of extreme weather events.

Today, business and policymakers are trying to return the carbon cycle back to its original state without disrupting the wealth and prosperity that long-cycle carbon has afforded society. Yet the carbon cycle is complex, and agriculture sits at the nexus of short- and long-cycle carbon, making agriculture both a substitute for (biofuels) and a consumer of (fertilizer) fossil fuels (see pg. 18). Due to its unique exposure across the carbon cycle, we believe higher investment, driven by either policy or higher prices, will be required to achieve the transition.

Fossil fuels feed half of humanity

Global population (billions, lhs)) and fertilizer use/share (kg/acre/%, rhs)



Source: USDA, FAO, Goldman Sachs GIR.

Climate change forces agricultural adaptation

Unlike for batteries, electric vehicles (EVs), or renewables, the rise in agricultural investment is likely to be forced by climate change, not by policy attempting to avoid its effects. Under current prices and policies, the decarbonization of agriculture is likely many years away. All major agricultural producers outside of the EU lack a developed carbon market or policies to enforce agricultural decarbonization, and low-cost measures around land use change are generally only applicable in EMs.

Instead, agricultural investment is likely to focus on the mitigation of yield shocks from increasingly extreme weather. Studies have shown that yields decline non-linearly in higher temperatures, with one study[2] estimating that US corn yields drop by 6% when temperatures rise from 29 °C to 35 °C. As a result, yield volatility will likely increase as climate change increases the frequency of high temperature events, which, without mitigating policy, will lead to periods of inventory depletion and higher prices, just as they have in recent years. Moreover, extreme weather events are likely to shorten the effective planting window for farmers, raising the likelihood that late-planted crops will be susceptible to weather shocks later in the growing cycle. Accordingly, prices will rise in order to incentivize more supply, and with US effective arable land near its limit, this will incentivize farmers to invest in weather-mitigating technologies. This is what we are seeing today—our Agribusiness analysts expect North American large equipment sales to rise 20% in 2022 as farmers capitalize on higher prices.

Policy also drives agricultural volatility

Due to its unique position in the carbon cycle, food also remains exposed to attempts to lower emissions elsewhere in the cycle. In effect, policy is working to replace long-cycle carbon energy sources with either short-cycle or inorganic energy (wind, solar, nuclear). Yet such policies create a structural imbalance in agriculture, restricting the flow of nutrients from fossil fuels to agriculture via lower natural gas production while raising the demand for plant-based carbon in transport as a short-cycle alternative to fossil fuels. Moreover, while green ammonia has the potential to decarbonize fertilizer, it is currently prohibitively costly, with our Carbonomics analysts estimating a cost of

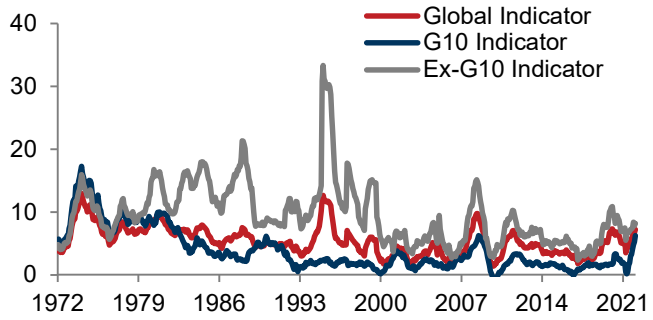
[2] Schlenker, W. and Roberts, M. (2009) Nonlinear temperature effects indicate severe damages to U.S. crop yields under climate change. The National Academy of Sciences, pp. 15594-15598.

$900/tonne of carbon abated. As a result, we expect agricultural fertilizer to remain dependent on natural gas for the foreseeable future, leaving this key input exposed to energy's volatility throughout the green transition.

The second leg of such policies—the increased use of biofuels—also keeps crop prices tied to fossil fuel prices throughout the transition. With EV adoption yet to reach a critical mass, biofuels are a growing substitute for petrol and diesel in internal combustion engine vehicles. We expect global biodiesel demand will grow 50% between 2020 and 2025, raising agricultural feedstock demand globally by 24m mt. As a key substitute, demand for biofuel rises when traditional fuels become scarce, which incentivizes biofuel refineries to raise production and bid up the price of key crops for use in fuel rather than food, just as occurred this past year. So, until alternative technologies are sufficiently widespread, crop prices will remain influenced by energy volatility and the underlying energy inflation inherent in the green transition.

While EM inflation is relatively low, G10 food inflation is at decade highs

Index points



Source: FAO, Goldman Sachs GIR.

Conflict complicates agriculture's transition

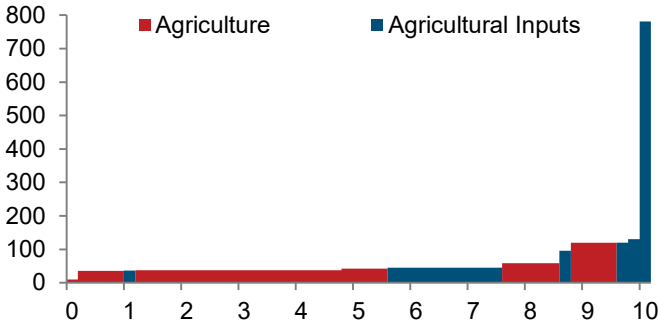
Overlaying climate change and a shifting carbon cycle is food scarcity's unique role as both a cause and result of conflict. Indeed, the Russia-Ukraine conflict likely generated more grains volatility this year than either soaring natural gas prices or extreme weather events. While a conflict affecting such a large proportion of global grains supply is unlikely to be repeated, recent history has several examples of the self-reinforcing cycle between geopolitical instability and agricultural scarcity. When conflict arises, traditional channels of food production and distribution become disrupted—fertilizer imports contract and farmers are conscripted to fight— as has occurred this year in Ukraine, Yemen in 2015, Syria from 2011, and Mali in 2012.

Except in the case of Ukraine, the food insecurity resulting from conflict has historically remained confined to the affected region, but still exemplifies the disruptive impact conflict has. And the causality runs both ways—with low-income households spending disproportionally on food, any agricultural shock is inherently inequality-increasing and weakens political stability. Moreover, policymakers implementing hoarding polices via export bans exacerbate overall agricultural scarcity while attempting to protect low-income households domestically—recent examples include India's ban on wheat and Indonesia's on palm oil. It's also important to distinguish conflict-related disruptions to regional food production and distribution from the relatively stable, major agricultural producers that influence financial grain prices. With food security more entrenched in such societies and agribusinesses with access to deeper pools of capital and government assistance, the dynamic between food prices and political instability is far weaker, though input-intensive farming leaves them just as, if not more, exposed to decarbonization impacts.

In the most extreme scenario, a sharp shock to agriculture can lead to broad social unrest, itself disruptive to agricultural production. The clearest example of this remains the recent violent protests in Sri Lanka following government bans on fertilizer imports that led to a 20% decline in key crop yields and widespread hunger. Though not directly the result of sustainable policies, the effect of reduced fertilizer supplies on yields, and subsequently society, offers a stark reminder of the risks to agriculture from rebalancing the carbon cycle.

Fertilizer is ripe for decarbonization

GHG emissions abatement potential (Gt CO2eq, x-axis), carbon abatement cost ($/tnCO2eq, y-axis)



Source: Goldman Sachs GIR.

Policy lag demands higher prices

It is important to understand that climate change will not necessarily drive a permanent rise in food prices or volatility. Indeed, Malthusian arguments about food shortages are oft-derided after a century of technological improvements that prove such fears wrong, and we expect this time to be no different to the past. Rather, it is increasingly clear that global systems—dictated by policy—are not yet prepared for climate change or decarbonization.

In the next decade, global production of food needs to become increasingly resilient to extreme climate events through new technologies such as improved crop genetics and breeding and precision data analytics. Policymakers will also likely need to explicitly ring-fence food production from broader fossil fuel decarbonization, creating a split in the pricing of fossil-fuel based energy between agriculture and other industries and avoiding placing a disproportionate cost on the poorest in society. The lack of preemptive policy to begin agriculture's adaptation to climate change will force the market to incentivize a reactive response through the only mechanism it has—higher prices. While the precise timing of this forced transition is unclear, this year has shown what happens when agriculture is caught between conflict, carbon, and climate change.

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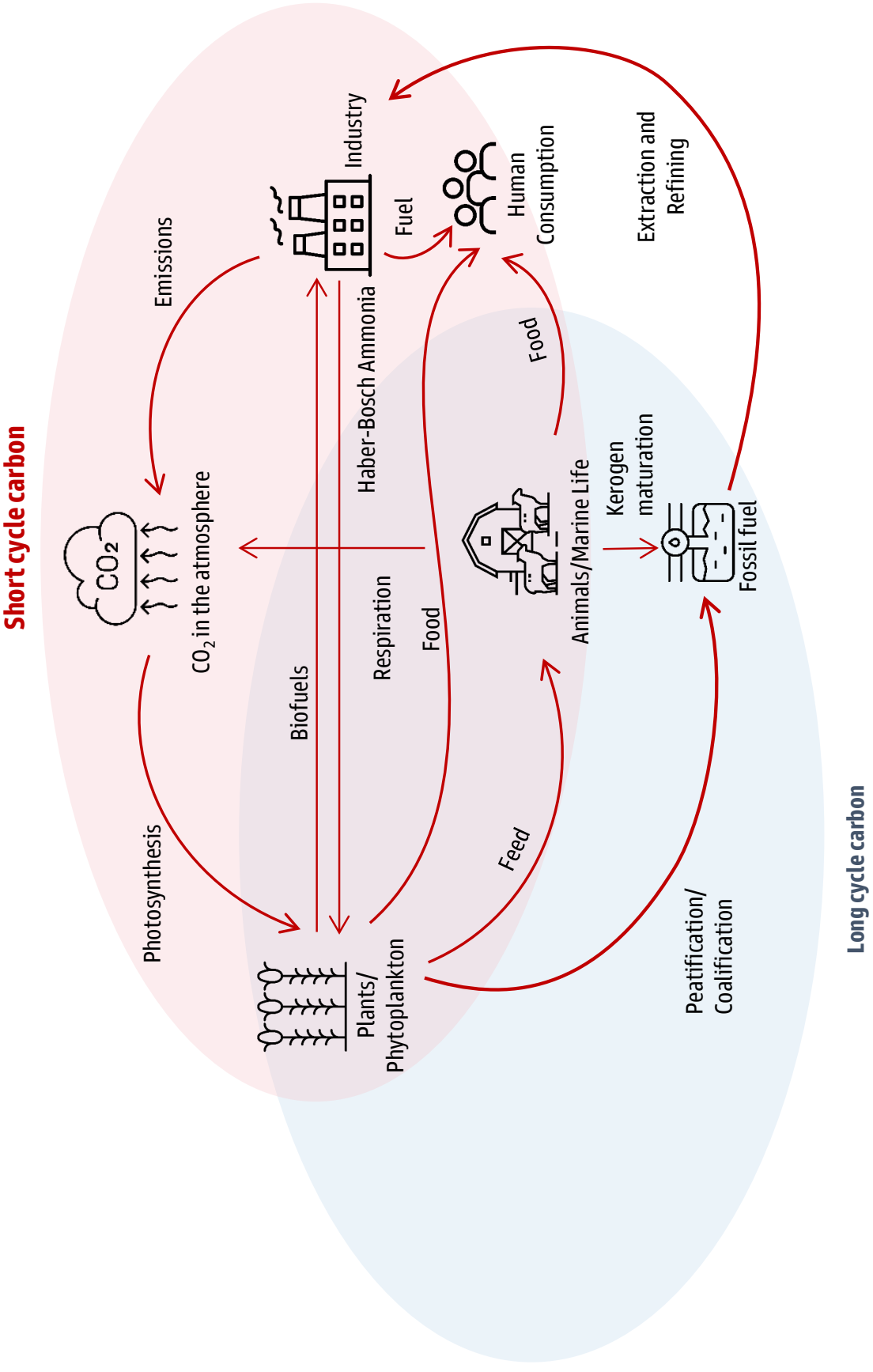
Agriculture's place in the carbon cycle

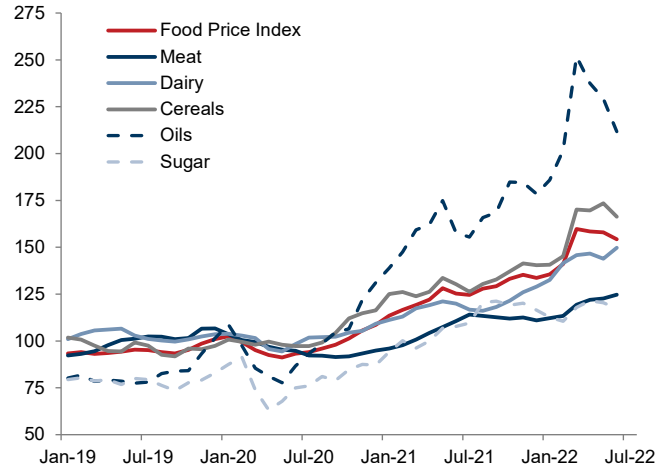


Source: NOAA, Goldman Sachs GIR.

The global food crisis in pics

Food prices have risen sharply over the past two years…

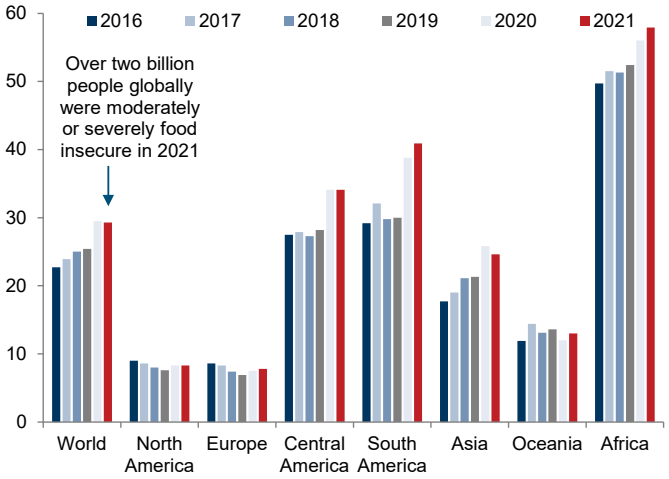
UN FAO Price Indices, 2014-2016 average = 100



Source: Food and Agriculture Organization of the UN, Goldman Sachs GIR.

…as has the number of people in food insecurity globally

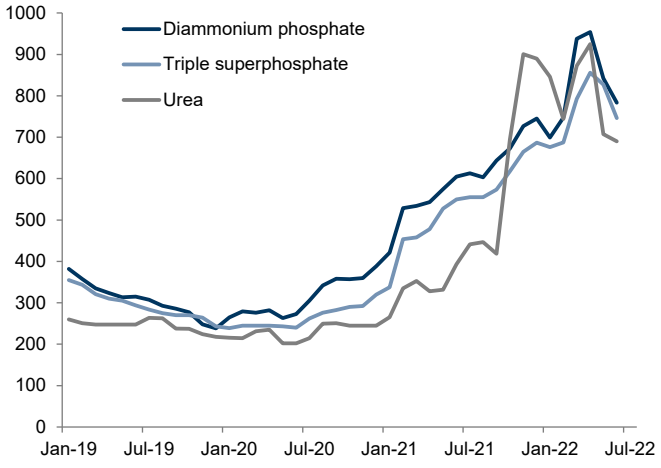
Prevalence of moderate or severe food insecurity, % of pop.



People in moderate food insecurity have reduced the quality/quantity of their food and are uncertain about their ability to obtain food; people in severe food insecurity have run out of food, and, at the most extreme, haven't eaten in days.
Source: Food and Agriculture Organization of the UN, Goldman Sachs GIR.

Fertilizer prices have also risen sharply since mid-2020…

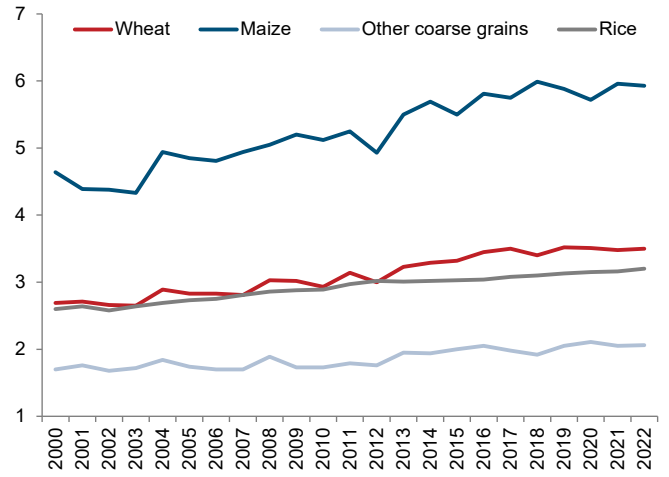
$/mt



Source: World Bank, Bloomberg, Goldman Sachs GIR.

…and cereal yields have stagnated in the last several years

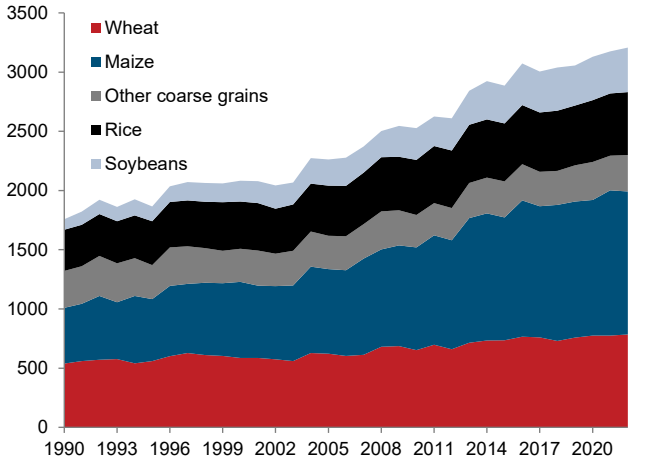
Yields by cereal, tonnes per hectare



Source: OECD, Food and Agriculture Organization of the UN, Goldman Sachs GIR.

Global food production has risen significantly…

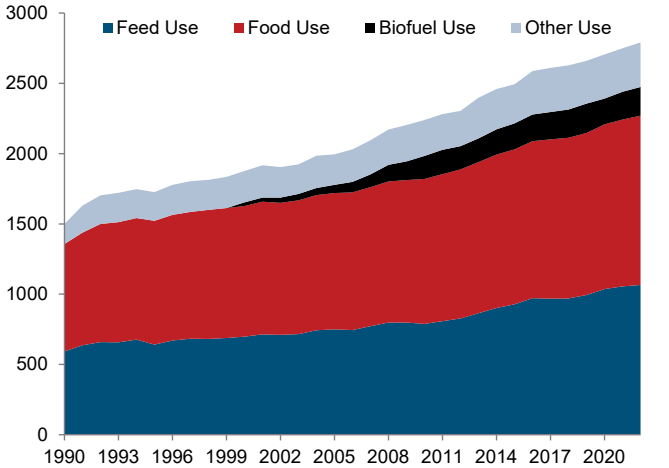
Production by commodity, million tonnes



Source: OECD, Food and Agriculture Organization of the UN, Goldman Sachs GIR.

…but demands on global food production have also increased

Use of cereal, million tonnes



Note: Cereal includes maize, wheat, other coarse grains, and rice.
Source: OECD, Food and Agriculture Organization of the UN, GS GIR.

Interview with Chris Barrett

Chris Barrett is International Professor of Agriculture and Stephen B. and Janice G. Ashley Professor of Applied Economics and Management at Cornell University and co-editor-in-chief of *Food Policy*. Below, he argues that the global food crisis predates the war in Ukraine and can only sustainably be resolved by increasing food production in innovative ways.

The views stated herein are those of the interviewee and do not necessarily reflect those of Goldman Sachs.

Jenny Grimberg: We hear a lot about the global food crisis. What's the actual situation on the ground?

Chris Barrett: The global food crisis isn't a food shortage crisis, but rather a food price crisis. Global wholesale food prices are roughly 25% higher today than a year ago. Retail prices—or what individual consumers pay at their local markets—are even higher because they include transportation costs that have increased due to the rise in oil prices. This has created a cost of living crisis for much of the world's poor and even for the middle class. Poor populations spend around 30-70% of their income on food, making it very difficult for them to continue to afford a healthy diet as food prices have soared. Around three billion people worldwide were unable to afford a healthy diet in 2020. Adding perhaps another half billion onto that can have knock-on effects for political stability, in particular in countries without robust social safety nets, as well as for cooperation between governments arising in response to ill-conceived policies like export bans. So the food crisis is manifesting in different ways, but the core of it is high prices.

Jenny Grimberg: Does the sharp rise in food prices primarily owe to the war in Ukraine?

Chris Barrett: No, most of the current crisis predates the war. The UN FAO's Food Price Index rose roughly 40% between May 2020 and May 2021—long before any serious concerns about Russia invading Ukraine—compared to a 20% rise between May 2021 and May 2022, for several reasons. One, with a 2-3x rise in ocean freight rates, shippers are not taking the time to load less lucrative, relatively low value-to-weight agricultural products. They race back to Asia with empty containers to refill them sooner with higher value products. Two, severe weather owing in large part to climate change have reduced production in large agricultural producers like India and China, increasing their import needs to meet domestic demand, and driving global food demand and prices higher. Three, the pandemic massively shifted where people consume food, requiring a dramatic shift in packaging, processing, and manufacturing logistics. And four, as incomes have grown worldwide, demand for animal products has risen significantly, such that livestock feed together with biofuels now consumes about half the world's grain production. Relatedly, China's hog population recovered from a massive African swine fever outbreak that occurred just before the pandemic, creating a huge added call on global maize and soy markets that are China's main source of feed.

The war in Ukraine certainly aggravated those issues. Ukraine and Russia are major exporters of several important agricultural products, wheat, maize, sunflower oil, and nitrogen fertilizer, in particular. The disruption of regular trade in these commodities has driven prices higher, as importers have been forced to use other, more expensive suppliers. The disruption in oil markets has also weighed heavily on food prices. For every dollar consumers spend on food, only about a quarter goes back to farms. The balance goes into all the different forms of value addition that happen when commodities leave the farm gate—transport, storage, processing, manufacturing, retailing, wholesaling, etc.—and a large part of the cost structure of those is oil, the price of which has increased markedly this year. A study I coauthored found that changes in world oil prices had faster and larger effects on local maize prices in East Africa than did changes in global maize prices, which seems counterintuitive but reflects the large impact of transport costs on food prices. Futures prices for wheat—the commodity the war has most disrupted—have basically returned to pre-invasion levels. But food prices remain high because the underlying structural pressures in agricultural markets have yet to be resolved.

Jenny Grimberg: So if the war ended tomorrow, that wouldn't mark the beginning of the end of the food crisis?

Chris Barrett: No. Even re-opening the port of Odessa to restore exports of Ukrainian agricultural products would make only a very small and transitory difference given that the wheat and maize loss from Ukraine accounts for less than 1% of the global production of grain-based calories. The fundamental problems of global agrifood systems existed before the war and will continue after the war ends. Global food demand has grown significantly while the growth rate of supply is slowing, largely due to climate change, leaving food systems perilously vulnerable to shocks like the war in Ukraine, another La Niña event, etc. Much less room exists for error today than even 10 years ago. So ending the food crisis will require increasing global food production—and at a lower cost but higher quality—to satisfy the growing demand for food.

Jenny Grimberg: Even if there isn't a food shortage, can farmers increasing food production help alleviate the crisis?

Chris Barrett: Yes, but there are important costs associated with doing so. Farmers respond quite quickly to higher food prices. The amount of acreage in cultivation has significantly increased in most of the Northern Hemisphere's growing areas, which is helping to fill in the market and stabilize prices. But we can't continue to expand land in cultivation indefinitely. Doing so has serious knock-on effects, not just for the climate because of the greenhouse gas emissions associated with deforestation and the tillage of soil, but also in terms of infectious diseases. As the agricultural frontier is pushed further into wetlands and forests, humans come into more contact with diseases that jump between species. About half of such zoonoses in the last 80 years are attributable to agricultural expansion, with Covid-19 being one good example. Putting more land in cultivation could help alleviate the food crisis over the short term, but it's not a

sustainable long term solution. That's why the Biden Administration's decision to release farmers from some conservation reserve program commitments is short-sighted policy. Farmers profit from high prices, and the increased supplies help alleviate short-run price pressures. But the land put into growing more feed crops like corn and soy carries a high longer-term climate, environmental, and even health cost.

Jenny Grimberg: To what extent could government policies like waiving biofuel blending requirements or further restricting exports help alleviate the crisis?

Chris Barrett: Relaxing biofuel mandates could help, although at a cost. Ethanol blending requirements in the US, Brazil, and parts of Europe exacerbate the food crisis while contributing essentially nothing to reducing greenhouse gas emissions. Their only real benefit is helping to keep gasoline and diesel prices down by blending in relatively lower cost ethanol. With the recent sharp rise in gasoline prices, that's a potentially important benefit, especially politically, that needs to be weighed against its impact on global food systems.

Export bans aren't at all beneficial beyond the very short term. They are protectionist measures intended to increase supplies and lower prices for domestic consumers. But the evidence suggests that export bans don't have much effect on prices beyond very short time horizons. Meanwhile, these bans anger domestic farmers that can't sell into the global market at a higher price, while encouraging other countries to implement their own bans and hurting importers. The research community is quite uniform in decrying the ineffectiveness of export bans, and increasingly policymakers are hearing that message. Indonesia, for example, banned palm oil exports earlier this year but lifted the ban within weeks, as it realized it was costing it diplomatic capital without much gain for domestic consumers. So I'm somewhat optimistic that WTO-type restrictions on export bans—similar to restrictions on import bans that have now been in place for decades—will eventually be enacted.

Jenny Grimberg: So what should be done to solve the food crisis?

Chris Barrett: The most immediate need is a large humanitarian response to address the over two billion people worldwide who are food insecure. G7 governments recently pledged $4.5 billion to address the global food crisis, which sounds generous but is inadequate relative to the roughly $45 billion in current global humanitarian appeals. So governments, philanthropies, and individual donors need to step up and donate. But that needs to be combined with addressing the underlying fundamental problems of global agrifood systems, especially on the supply side. Food demand will continue to rise as populations grow, incomes rise, and more people move to urban areas. Efficient, lower-cost food production must rise to meet that demand. Significant investments are needed in circular systems that can recover waste and turn it into fertilizers and animal feed, thereby taking pressure off of land. Investments are also needed in controlled-environment agriculture that can affordably expand the supply of fruits and vegetables near urban consumers, so the reliance on long supply chains that emit massive amounts of greenhouse gas can be reduced. And crop and livestock genetic improvements, as well as alternative proteins to help sustainably satisfy the growing demand for animal-sourced foods, are crucial. Such investments will allow the world to produce more and healthier food on less land using less water and costly inputs. These are key to solving the food crisis longer term.

Jenny Grimberg: Are you optimistic or pessimistic that progress can be made towards solving this crisis?

Chris Barrett: We have massive opportunities to do so, but the question is, will business and political leaders rise to meet this challenge after shirking from it for a quarter century? Frankly, I see more potential from the private sector than from the public sector. The US government, for example, has reduced its investments in agrifood research by about a third over the last decade, but corporations have significant cash sitting on the sidelines that could be invested in transformative technologies that have the potential to turn the agrifood system from a source of greenhouse gas emissions into a carbon sink, satisfy global needs for better diets, and decouple food production from land use. But the window for meeting this challenge is closing. If we fail to make more headway before the early 2030s, sustainably solving the food crisis will become much more difficult.

Jenny Grimberg: What could that mean for political stability in developing countries? Could we see another Arab Spring?

Chris Barrett: Absolutely, it's a real risk. We know empirically that food insecurity causes unrest. But the mechanisms are subtler than people probably realize. In Tunisia, while the bread riots that preceded the fall of the government in 2011 drew major attention, opposition to the existing government predated those riots; the rise in food prices merely increased support for this opposition. The government of Madagascar was overthrown in 2009 indirectly due to high rice prices, when the population was unhappy with a deal that the government struck leasing 1.3 million hectares of arable land to Daewoo, a Korean company looking to ensure Korea's food security. Several governments around the world today are perilously close to falling, in part because people are increasingly disenchanted with their government's social protection measures, including around food security. That has major potential diplomatic and military implications. And not just for those countries but also for the world, because one consequence of civil unrest and food insecurity is mass migration, which is already at record-highs. People leave their homes when they don't have enough food to feed their families, especially if bullets are flying.

Jenny Grimberg: But has the expansion of social safety nets in recent years mitigated the risk of such events?

Chris Barrett: To some extent. In the decade since the Arab Spring, more governments have mounted credible social protection programs for vulnerable populations. While they're more widespread in high-income countries, a number of low- and middle-income countries have also built out extensive social safety nets, especially during the pandemic, which diffuses political tensions and reduces the risk of civil unrest. But safety nets are still very much a patchwork in the low-income world, and many low-income countries remain quite vulnerable to the global food crisis today, especially because not enough humanitarian aid went to such countries. These countries are most at risk for social unrest and a potentially violent overthrow of the government, and so bear closely watching for these countries', and the world's, sakes.

The food crisis: an EM pressure point

Kamakshya Trivedi and Teresa Alves gauge the implications of higher global food prices for EM Frontier economies and asset markets

Amid the substantial commodity price volatility that has been a key market driver in recent months, the sharp rise in global food prices, predating but exacerbated by the war in Ukraine, has been especially problematic for less-developed emerging economies (EMs). Global food prices today are off their peaks but remain around more than 40% above pre-pandemic levels, significantly affecting the poorest countries given the relatively large weight of food in consumption baskets in such jurisdictions and the lack of fiscal resources in some that could help shield their populations from the pain of higher prices. That not only has implications for political stability, as seen most recently in Sri Lanka—where sharp currency depreciation in the aftermath of the war led to sovereign default and an overthrow of the government—but also for both credit and FX markets across the EM Frontier space.

Mapping the food price challenge

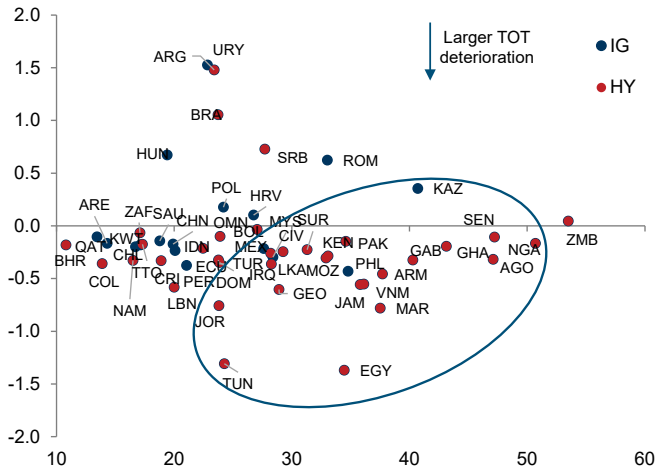
While the Dollar value of food commodity trade volumes is often dwarfed by those of energy and metals, we find that food-only (wheat, corn, soybeans, live cattle, and lean hogs) terms of trade have deteriorated from pre-pandemic levels for 80% of EMs. This includes almost all of the economies whose sovereign debt offers relatively high yields, with Egypt, Tunisia, and Morocco experiencing the sharpest deteriorations. Even some EMs that have benefitted from the broader surge in energy and other commodity prices, such as Angola, Nigeria, and Ghana, are actually negatively impacted by food inflation. Combining these food-only terms of trade with the weight of food in each country's CPI basket, we find that Egypt, Morocco, Angola, and Ghana are among the countries most exposed to higher food prices. An important mitigating factor is that countries with stronger fiscal balances have more resources, and therefore a greater ability, to absorb the shock from higher food prices rather than passing it onto the broader population. For that reason, countries like Angola and Gabon whose fiscal balances have benefitted from a rise in oil prices could prove more resilient, whereas large fiscal deficits in countries like Egypt, Ghana, Tunisia, and Morocco mean that high food prices could prove more of a challenge.

Negative implications for markets

These negative developments are already being reflected in market prices. EM sovereign credit spreads have widened significantly year-to-date, with the largest moves being in the lowest-rated segments of the EM credit universe, where pressures have been particularly acute amid a more challenging global macro backdrop. And the food price shock has perhaps been most clearly priced in the sharp devaluation of the Egyptian Pound, which has fallen by around 20% against the Dollar, although the currencies of Pakistan and Ghana, among other EMs, have also depreciated as high food prices have come alongside a challenging macro mix. But as with the case of the Arab Spring back in 2010-11, in which rising food prices were a key catalyst, the real and lasting downside to EM asset markets would likely come if food prices rise anew and the wave of protests across EM culminates in broader social and political instability, as was the case in Sri Lanka recently. Our look at exposure to the food crisis suggests that the credit spreads of Egypt, Ghana, Tunisia, and Morocco warrant the closest monitoring.

"Food-only" terms of trade have deteriorated for over 80% of the countries in our sample

Food weight in CPI basket (%, x-axis), food-only TOT change since 2019, (% of GDP, y-axis)

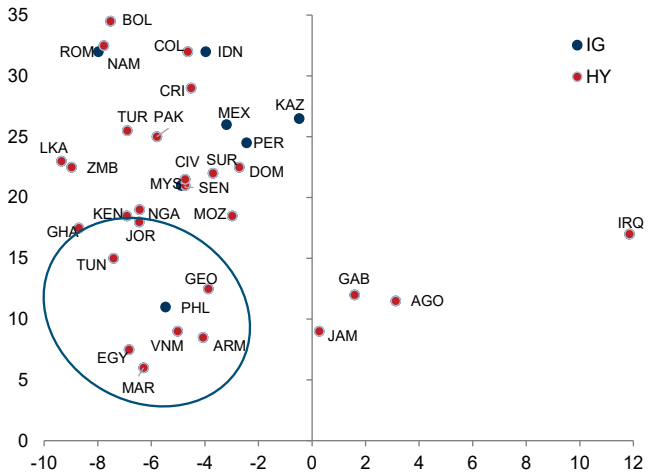


Note: When the food-only CPI weight is not available, we take the food & non-alcoholic beverages weight.

Source: UNCTAD, IMF, Haver, Goldman Sachs, Angola Data Portal, Statistical Institute of Belize, Statistical Institute of Jamaica, Namibia Statistics Agency, Statistics Suriname, Bloomberg, Central Statistics Office, Goldman Sachs GIR.

Frontier EMs like Egypt, Ghana, Tunisia, and Morocco are the most vulnerable to higher food prices

2022 fiscal balance (%, x-axis), rank of exposure to food inflation (y-axis)



Note: Y–axis ranking is determined by combining food-only terms of trade change relative to 2019 (a lower ranking indicates a larger terms of trade deterioration) and the weight of food in each country's CPI basket (a lower ranking indicates a higher share of food in the basket) and then averaging to create one ranking of exposure to food inflation; 2022 projected fiscal balances per IMF forecasts.

Source: IMF, Haver Analytics, Goldman Sachs GIR.

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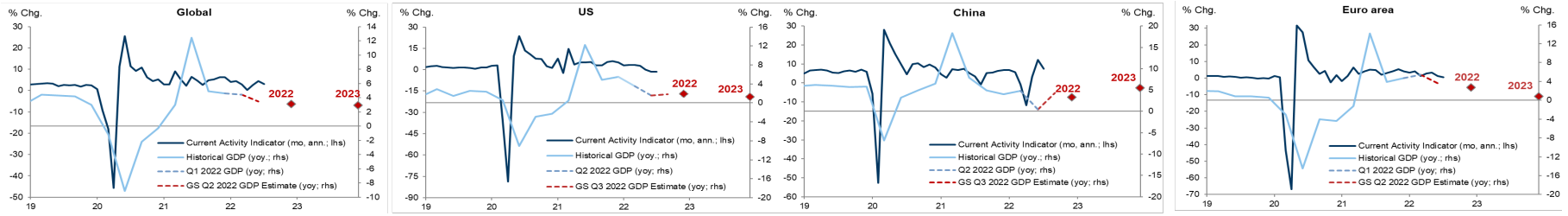
GS GIR: Macro at a glance

Watching

- **Globally,** we expect below-trend Q4/Q4 real GDP growth of 1.7% in 2022 as the sizable growth drags from the Russia-Ukraine conflict, tighter financial conditions, sluggish real income growth, and a substantial slowdown in housing activity more than offset medical improvements and a consumption boost from pent-up savings. We expect the global inflation surge to peak in the coming months, and think the combination of a moderation in demand growth, improvements in goods and labor supply throughout 2H22, and tighter monetary policy will be sufficient to bring inflation back toward DM central banks' targets over the next two years.
- **In the US,** we expect Q4/Q4 growth to slow to 0.4% in 2022, driven by a large fiscal drag and a negative impulse from tighter financial conditions. We see a 30% probability of entering a recession over the next year and nearly even odds at a two-year horizon. We expect core PCE inflation to fall to 4.5% by end-2022, although further supply chain disruptions, stronger wage growth, or firmer shelter inflation could keep inflation somewhat higher for longer. We see the unemployment rate remaining at 3.6% through end-2022 before rising to 3.8% by end-2023 and 4.0% by end-2024.
- **We expect the Fed** to deliver a 50bp hike in September and 25bp hikes in each of November and December, though the recent surge in shelter inflation poses upside risk to the path of the funds rate in 2H. We expect a terminal Fed funds rate of 3.25-3.5%. On the fiscal policy front, we expect the passage of a reconciliation package that includes drug pricing changes, a 15% corporate minimum tax and other tax measures, and energy and climate provisions, though see this to having only a modest net fiscal impact.
- **In the Euro area,** we expect a modest recession in 2H22, driven by continued significant gas supply disruptions owing to the war in Ukraine and slowing growth momentum, though risks are skewed toward a sharper downturn in the event of complete shutdown of Russian gas supplies. We expect headline inflation to average 8.4% in 2022 and 5.1% in 2023.
- **We expect the ECB** to hike by 50bp in September before a return to a more gradual 25bp pace in October and December, though the threat of further Russian gas flow disruptions and the possibility of renewed sovereign stress skew the risk to the ECB's path to the downside.
- **In China,** we expect full-year real GDP growth of 3.3% in 2022. On a sequential basis, we expect a sharp rebound of 17.5% qoq ann. growth in Q3 ahead of the 20th Party Congress in the fall. We see the risks to our baseline as broadly balanced, with upside risks from stronger-than-expected policy stimulus and downside risks from uncertainty associated with Covid, housing and external demand.
- **WATCH THE RUSSIA-UKRAINE CONFLICT AND COVID.** We expect the impact on global growth from the Russia-Ukraine conflict to continue to be sizable, with the largest hit concentrated in the region itself, the Euro area, and other commodity-importing countries, but see greater upside risk to inflation from potential renewed rises in global energy and food prices and the surge in European gas prices. On the virus front, we expect that ongoing behavioral adjustments will limit the economic impact of the pandemic in most major economies (excluding China) throughout the rest of the year, though the emergence of a worse variant that more than offsets these adjustments remains a major downside risk.

Goldman Sachs Global Investment Research.

Growth



Source: Haver Analytics and Goldman Sachs Global Investment Research.
Note: GS CAI is a measure of current growth. For more information on the methodology of the CAI please see "Lessons Learned: Re-engineering Our CAIs in Light of the Pandemic Recession," Global Economics Analyst, Sep. 29, 2020.

Forecasts

Economics						Markets									Equities									
GDP growth (%)	2022			2023		Interest rates 10Yr (%)	Last	E2022	E2023	FX		Last	3m	12m	S&P 500	E2022		E2023		Returns (%)	12m	YTD	E2022 P/E	
	GS (Q4/Q4)	GS (CY)	Cons. (CY)	GS (CY)	Cons. (CY)											GS	Cons.	GS	Cons.					
Global	1.7	3.1	3.0	2.9	2.9	US	2.78	3.30	3.15	EUR/$		1.01	1.05	1.15	Price	4,300	--	--	--	S&P500	12.0	-16.0	17.9x	
US	0.4	1.9	2.0	1.2	1.3	Germany	0.86	2.00	2.00	GBP/$		1.20	1.19	1.25	EPS	$226	$229	$239	$247	MXAPJ	17.0	-17.0	12.7x	
China	3.8	3.3	4.0	5.5	5.2	Japan	0.20	0.25	0.35	$/JPY		137	125	123	Growth	8%	10%	6%	8%	Topix	8.0	-2.0	14.0x	
Euro area	0.6	2.7	2.7	0.8	1.3	UK	1.94	2.65	2.20	$/CNY		6.7	6.75	6.5						STOXX 600	7.0	-12.0	12.3x	
Policy rates (%)	2022			2023		Commodities	Last	3m	12m	Credit (bp)		Last	4Q22	2Q23	Consumer	2022		2023		Wage Tracker 2022 (%)				
	GS	Mkt.		GS	Mkt.											CPI (%, yoy)	Unemp. Rate	CPI (%, yoy)	Unemp. Rate	Q1	Q2	Q3	Q4	
US	3.38	4.01		3.38	3.63	Crude Oil, Brent ($/bbl)	107	140	130	USD	IG	144	175	140	US	8.4	3.6	4.2	3.8	5.8	5.6	--	--	
Euro area	1.00	1.71		1.50	1.73	Nat Gas ($/mmBtu)	8.69	7.15	3.80		HY	491	625	465	Euro area	8.4	6.6	5.0	6.2	--	--	--	--	
China	2.10	2.62		2.10	2.86	Copper ($/mt)	7,627	6,700	9,000	EUR	IG	205	229	175	China	2.5	--	2.1	--	--	--	--	--	
Japan	-0.10	0.04		-0.10	0.08	Gold ($/troy oz)	1,714	2,100	2,500		HY	585	655	491										

Source: Bloomberg, Goldman Sachs Global Investment Research. For important disclosures, see the Disclosure Appendix or go to www.gs.com/research/hedge.html.

Market pricing as of July 27, 2022.

Glossary of GS proprietary indices

Current Activity Indicator (CAI)

GS CAIs measure the growth signal in a broad range of weekly and monthly indicators, offering an alternative to Gross Domestic Product (GDP). GDP is an imperfect guide to current activity: In most countries, it is only available quarterly and is released with a substantial delay, and its initial estimates are often heavily revised. GDP also ignores important measures of real activity, such as employment and the purchasing managers' indexes (PMIs). All of these problems reduce the effectiveness of GDP for investment and policy decisions. Our CAIs aim to address GDP's shortcomings and provide a timelier read on the pace of growth.

For more, see our CAI page and Global Economics Analyst: Trackin' All Over the World – Our New Global CAI, 25 February 2017.

Dynamic Equilibrium Exchange Rates (DEER)

The GSDEER framework establishes an equilibrium (or "fair") value of the real exchange rate based on relative productivity and terms-of-trade differentials.

For more, see our GSDEER page, Global Economics Paper No. 227: Finding Fair Value in EM FX, 26 January 2016, and Global Markets Analyst: A Look at Valuation Across G10 FX, 29 June 2017.

Financial Conditions Index (FCI)

GS FCIs gauge the "looseness" or "tightness" of financial conditions across the world's major economies, incorporating variables that directly affect spending on domestically produced goods and services. FCIs can provide valuable information about the economic growth outlook and the direct and indirect effects of monetary policy on real economic activity.

FCIs for the G10 economies are calculated as a weighted average of a policy rate, a long-term risk-free bond yield, a corporate credit spread, an equity price variable, and a trade-weighted exchange rate; the Euro area FCI also includes a sovereign credit spread. The weights mirror the effects of the financial variables on real GDP growth in our models over a one-year horizon. FCIs for emerging markets are calculated as a weighted average of a short-term interest rate, a long-term swap rate, a CDS spread, an equity price variable, a trade-weighted exchange rate, and—in economies with large foreign-currency-denominated debt stocks—a debt-weighted exchange rate index.

For more, see our FCI page, Global Economics Analyst: Our New G10 Financial Conditions Indices, 20 April 2017, and Global Economics Analyst: Tracking EM Financial Conditions – Our New FCIs, 6 October 2017.

Goldman Sachs Analyst Index (GSAI)

The US GSAI is based on a monthly survey of GS equity analysts to obtain their assessments of business conditions in the industries they follow. The results provide timely "bottom-up" information about US economic activity to supplement and cross-check our analysis of "top-down" data. Based on analysts' responses, we create a diffusion index for economic activity comparable to the ISM's indexes for activity in the manufacturing and nonmanufacturing sectors.

Macro-Data Assessment Platform (MAP)

GS MAP scores facilitate rapid interpretation of new data releases for economic indicators worldwide. MAP summarizes the importance of a specific data release (i.e., its historical correlation with GDP) and the degree of surprise relative to the consensus forecast. The sign on the degree of surprise characterizes underperformance with a negative number and outperformance with a positive number. Each of these two components is ranked on a scale from 0 to 5, with the MAP score being the product of the two, i.e., from -25 to +25. For example, a MAP score of +20 (5; +4) would indicate that the data has a very high correlation to GDP (5) and that it came out well above consensus expectations (+4), for a total MAP value of +20.

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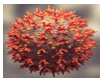

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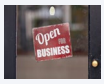

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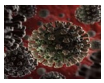

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