



BUSINESS SCHOOL
J.P. MORGAN CENTER
FOR COMMODITIES

Food Commodity Market Review & Outlook

Tom Brady
October 2022

JP MORGAN CENTER FOR COMMODITIES + GLOBAL ENERGY MANAGEMENT

J.P. Morgan Center for Commodities (JPMCC)

“A World-Class Commodities Center”

- The J.P. Morgan Center for Commodities focuses upon a broad range of commodities, including agriculture, metals & minerals and traditional & renewable energy
 - Launched in 2012
 - Innovative undergraduate, graduate & professional education:
 - Commodity market fundamentals, trading, finance and investment, risk management and policy & regulation
 - State of the art software and technology tools
 - Deep interaction with industry executives as advisory council members



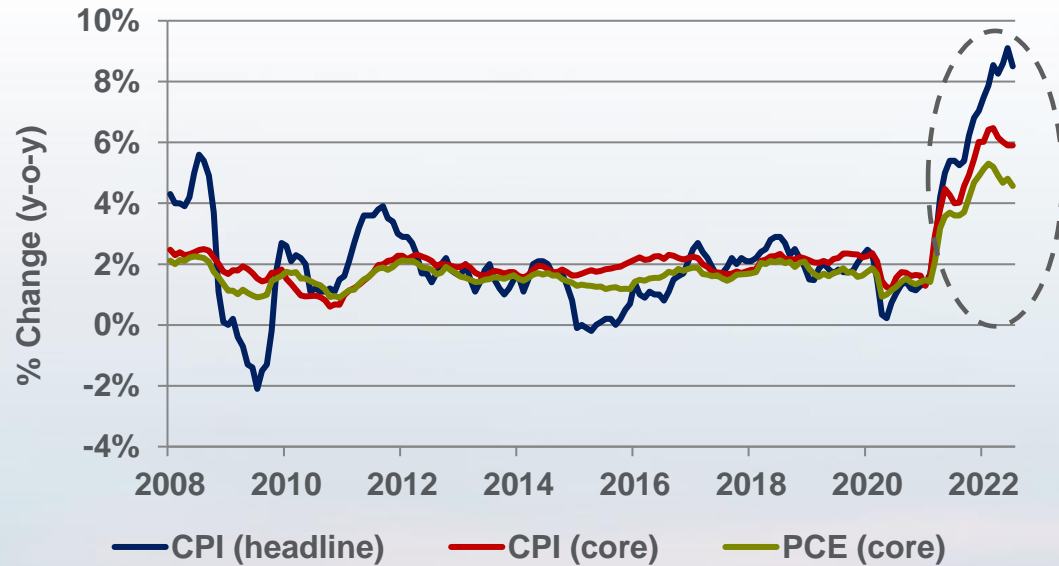
Powered by Partnership

JP MORGAN CENTER FOR COMMODITIES + GLOBAL ENERGY MANAGEMENT

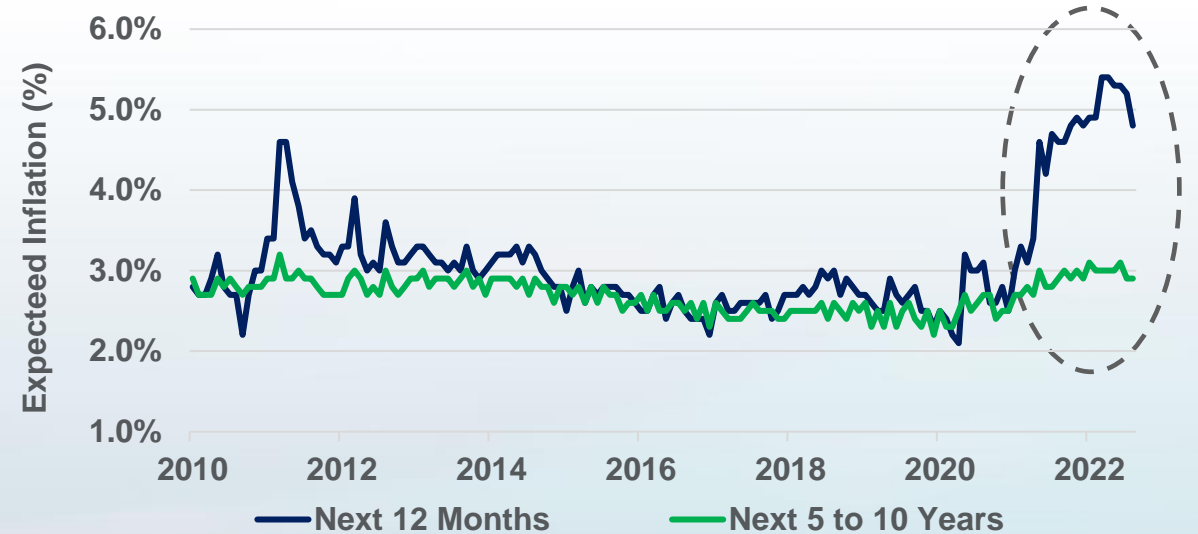
 **Business School**
UNIVERSITY OF COLORADO DENVER

Inflation Continues!

“Current” Inflation (U.S. consumer indices)



Inflation Expectations (survey-based)



Inflation Expectations (market-based)

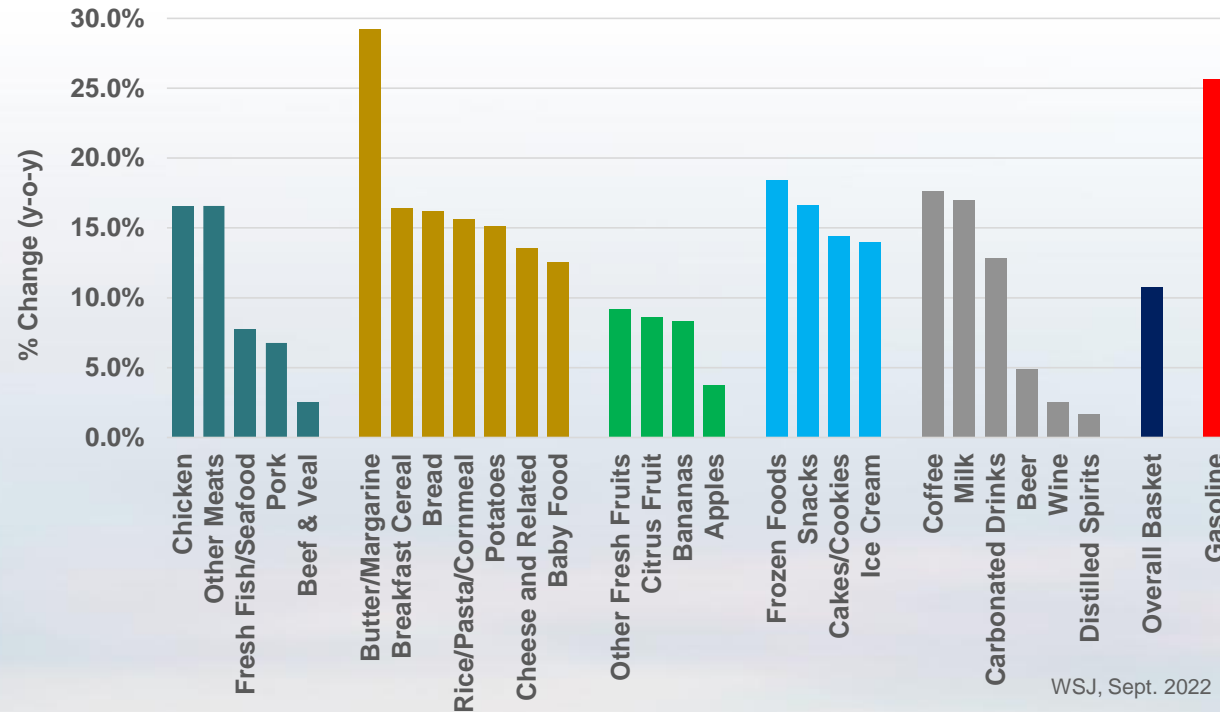


Powered by Partnership

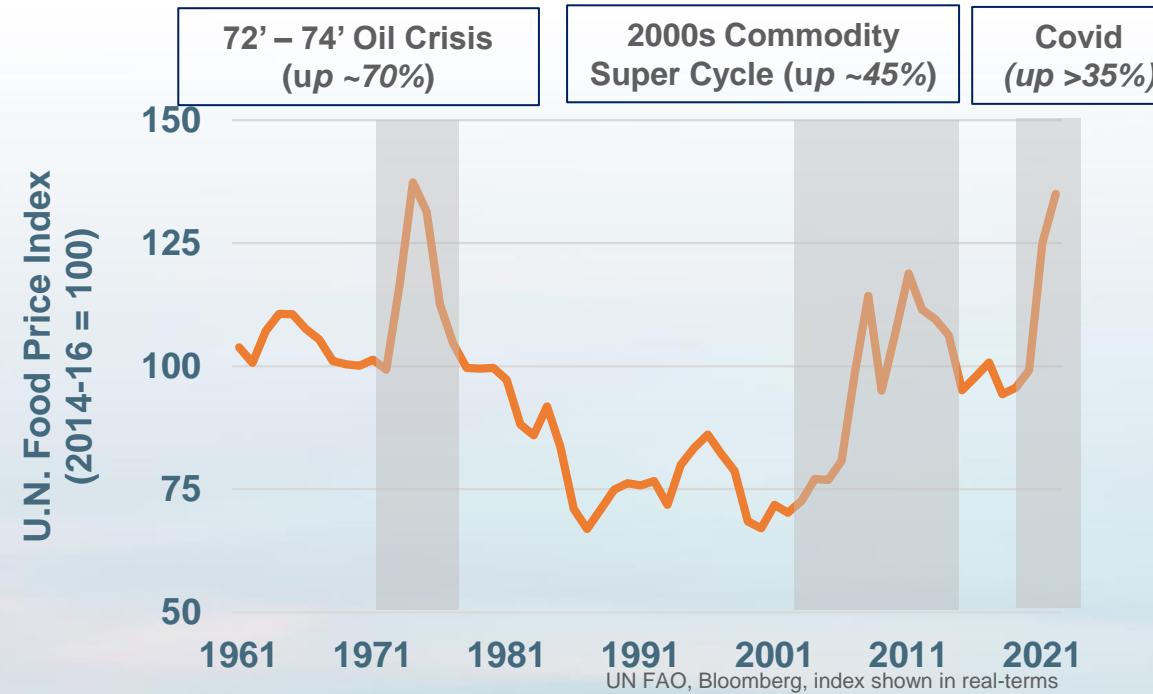
JP MORGAN CENTER FOR COMMODITIES + GLOBAL ENERGY MANAGEMENT

Food Prices

U.S. Food Price Inflation (Sep. 2022)



Int'l Food Prices (3rd Spike since 1960)



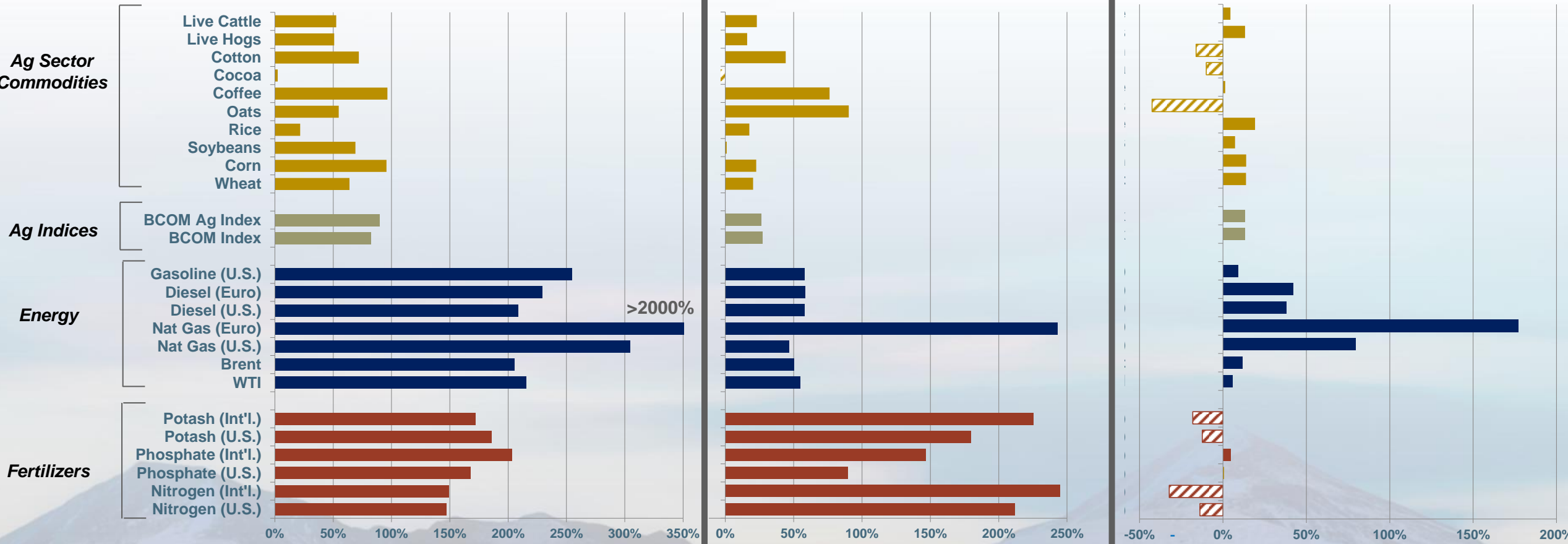
- Persistent drought conditions in North and South America and Ukraine war creating tight global food supplies
- Analysts now anticipate that global grain and oilseeds markets, need two consecutive years of normal crop yields to stabilize global food situation
- USDA estimates ~1.3B people from low- and middle-income countries are food insecure (up ~10% from 2021 estimate)

Farm input costs rising more than Ag Commodities (Price Change)

Since Onset of Covid (Mar. 2020)

2021

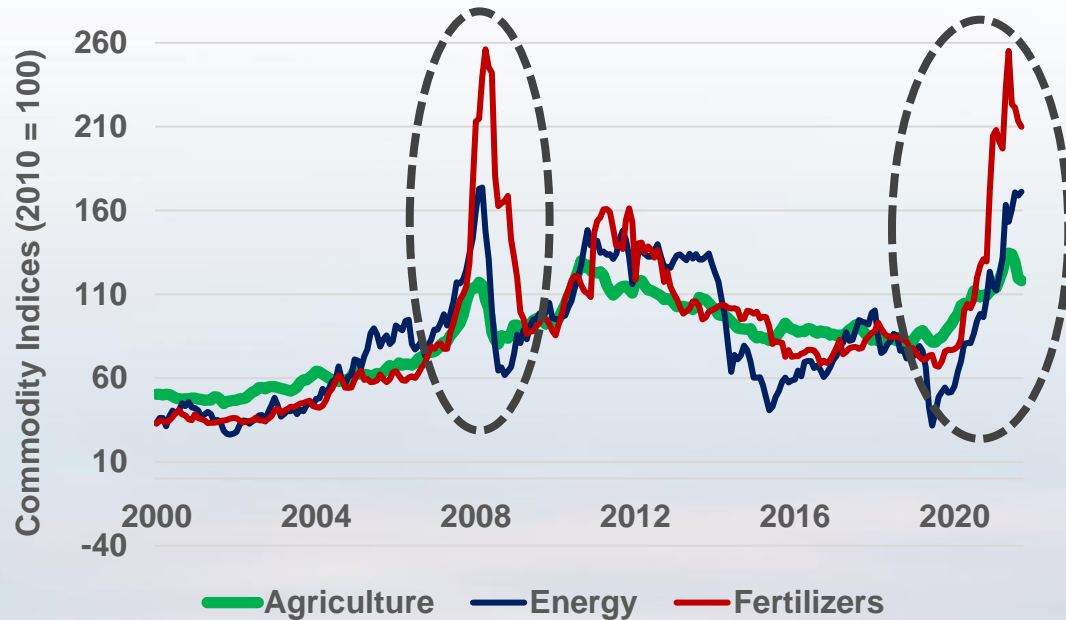
2022 (YTD)



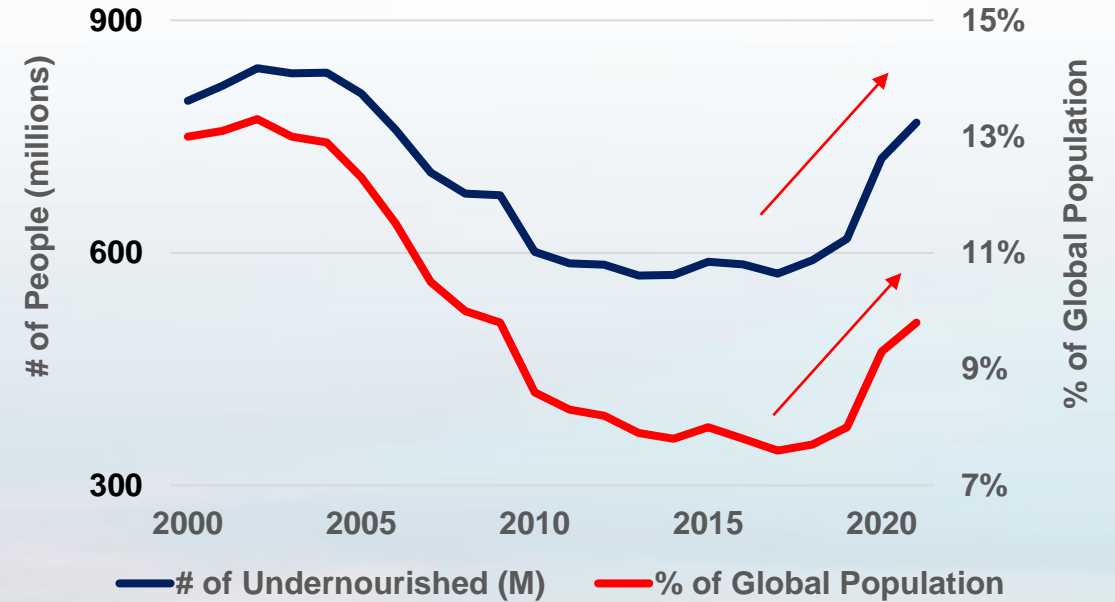
Source: JPMCC, Bloomberg

Farm Profitability & Food Insecurity

Farm Related Indices



Global Food Insecurity

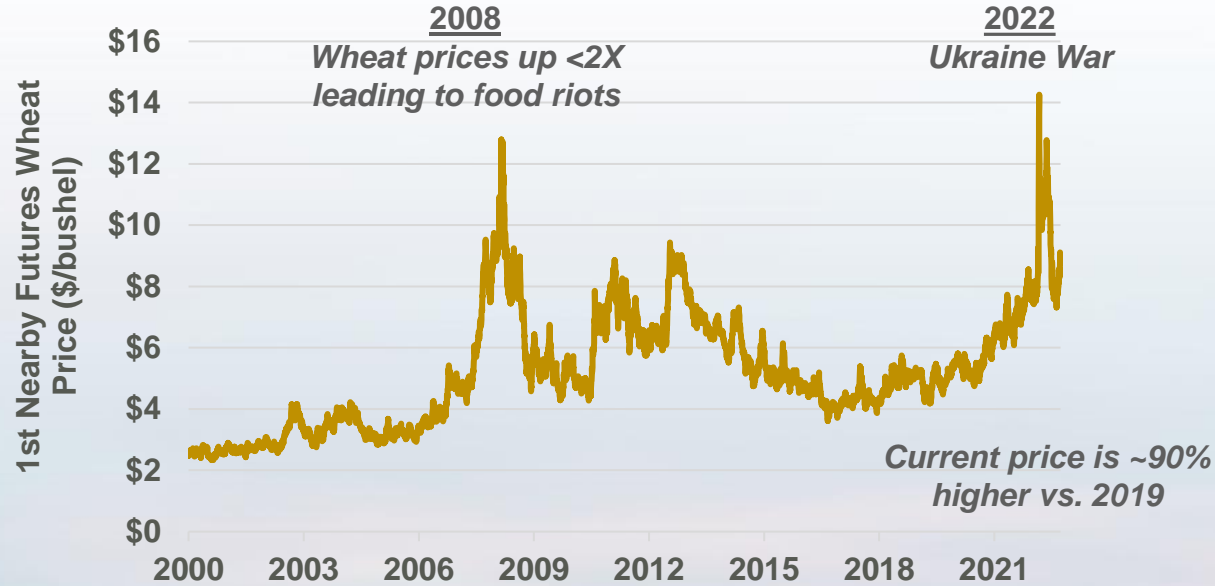


UN FAO, FAOSTAT

- Globally, food prices have climbed but not as much as energy and fertilizer prices
 - Will negatively impact farm profitability and crop yields in 2022 and onward
- People experiencing undernourishment have trended upward since 2016
 - ~770M in 2021 (~10% of global total)
 - This was 65% in 1950, 25% in 1970 and 15% in 2000

Wheat Prices

Wheat Prices (2000 onward)



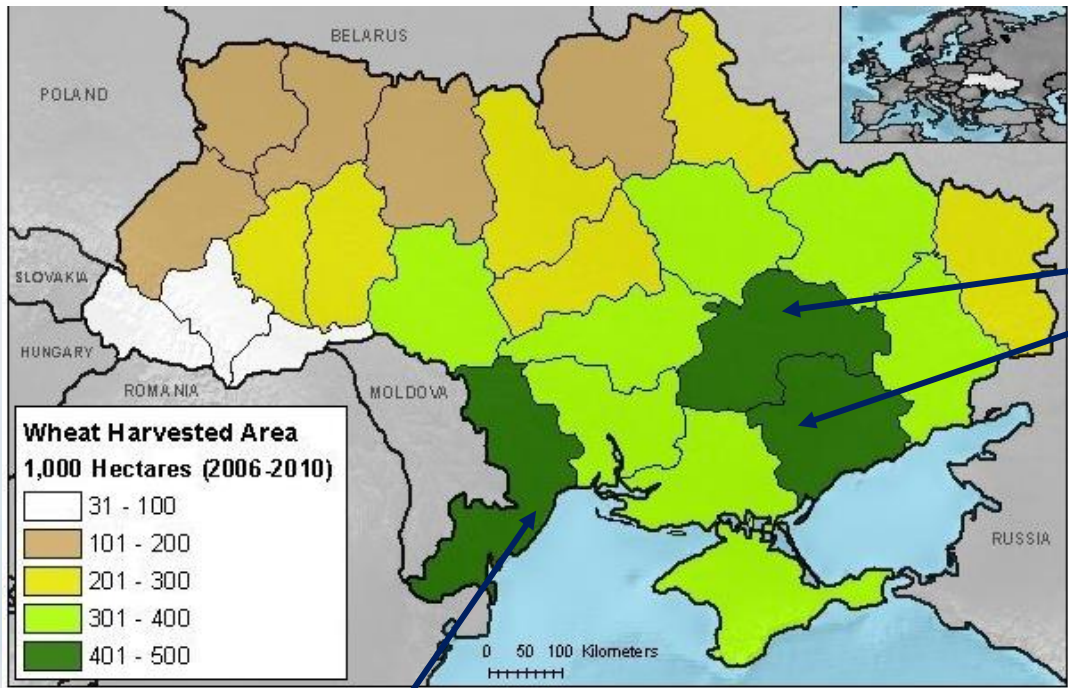
Wheat Prices (2022 YTD)



- ~90% of global supplies of key food crops (wheat, corn, ...) come from <10% of global countries
 - Market disruptions are thus prevalent when a key producing country cannot export
- Ukraine and Russia separately signed agreements with Turkey and the UN (Black Sea Grain Initiative)
 - Wheat prices have stabilized following the signing in late July, buoyed by strong expected Russian exports

Ukraine War

Ukraine: Wheat Harvest Areas



Odeska

Dnipropetrovsk
Zaporizhia

Russia Invasion of Ukraine Status (Sep. 15)



- In August, total exports = 1.6Mt (vs. 5Mt/month under agreement)
 - Ukraine needs to export ~7Mt/month for capacity for fall harvest & for farmers to cover planting costs for next season
- Exports primarily coming from previous stocks at ports as agreement does not cover safe passage of grain from farm to ports
- Agreement expires on Nov. 19th, 2022

Fertilizer: Input Commodities

Nitrogen (Ammonia)

Russia (~11% of Total)



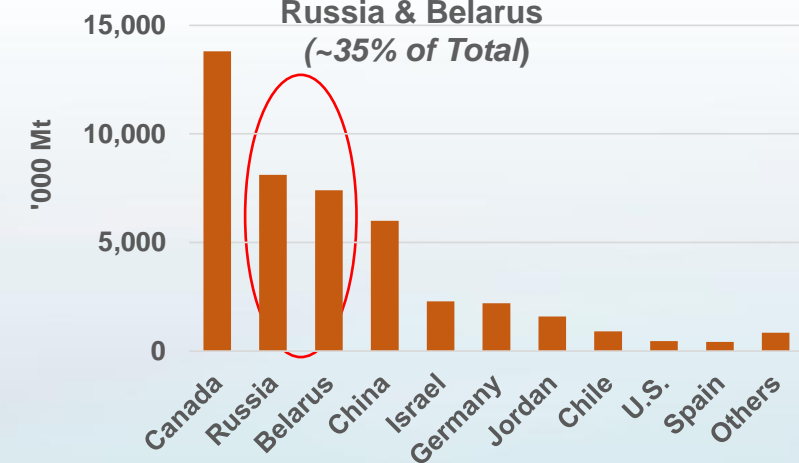
Phosphate Rock

Russia (~6% of Total)



Potash

Russia & Belarus (~35% of Total)

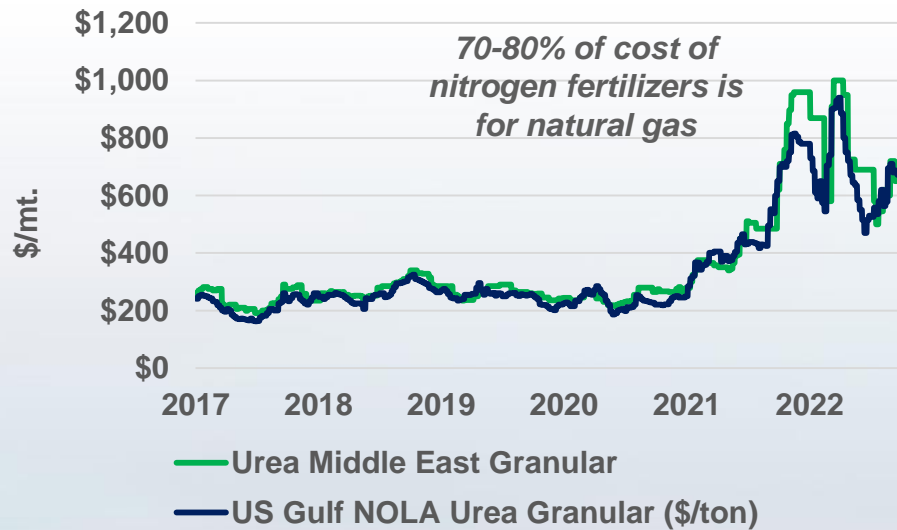


USGS Mineral Commodity Summaries, 2022; International Fertilizer Association

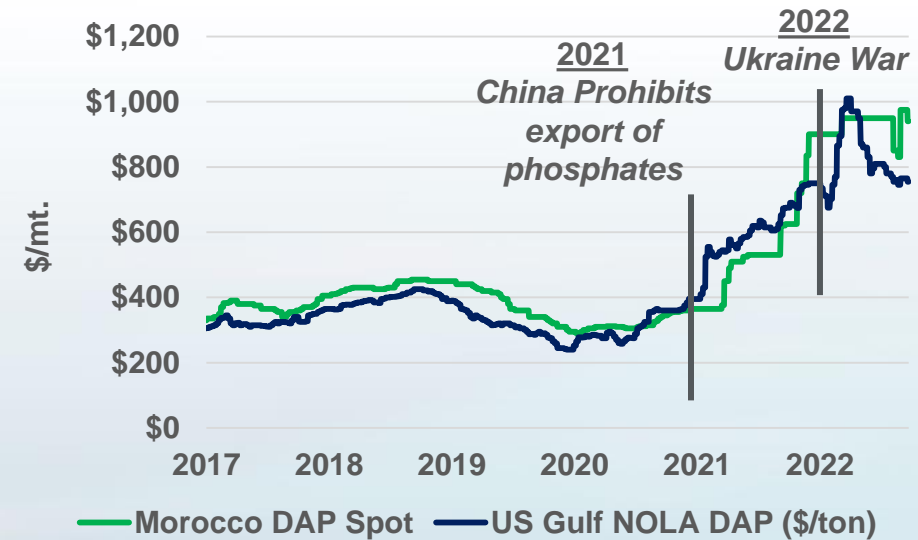
- Key commodity inputs to fertilizers are exposed to varying geopolitical risks
 - Globally, farmers prioritize applying nitrogen fertilizers to fields
- Ammonia is a key to the manufacture of nitrogen and phosphate fertilizers
 - 80 – 90% of cost to manufacture ammonia is from natural gas
- Russia & Belarus account for ~35% of global potash supply
 - Global potash supply expected to decline in 2022 due to export restrictions

Fertilizer: High Prices to Impact Future Crop Yields

Urea (Nitrogen) Fertilizers

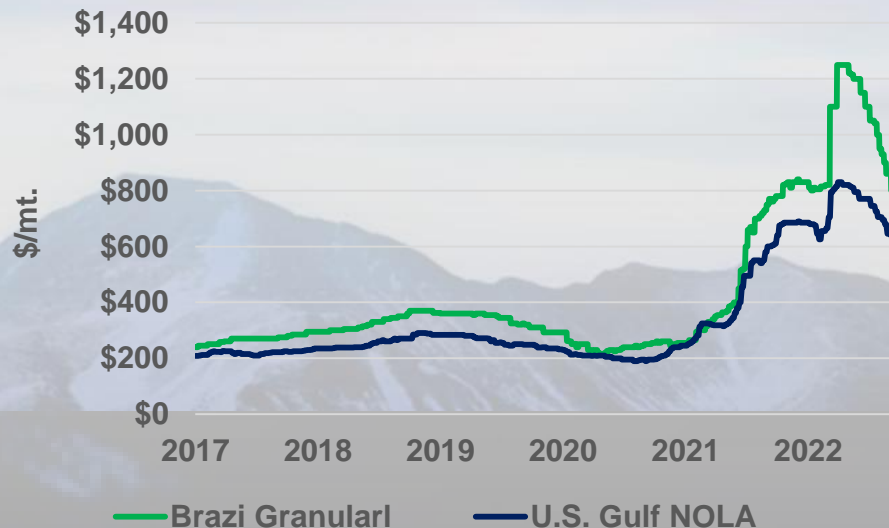


Phosphate Fertilizers



Source: JPMCC & Bloomberg

Potash Fertilizers



- U.S. crop yield = ~50 bu./acre in 2020
 - <5 bu./acre in 1920 (Prior to Haber-Bosch process) leading to synthetic nitrogen fertilizers
- Without these fertilizers, ~50% of global population could not be fed (nearly 4B people)

Energy: Prices Off Peaks, but Remaining High

U.S. Natural Gas Prices

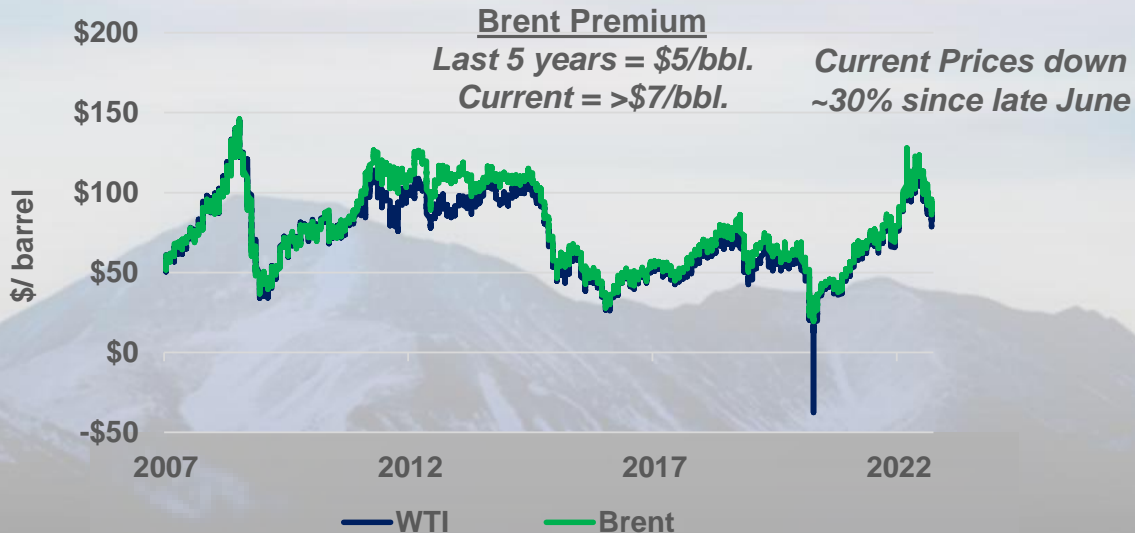


European Natural Gas Prices



Source: JPMCC, Bloomberg

Crude Oil Prices



- Strong U.S. dollar has contributed to energy price drop (lower global purchasing power)
- EU has set a voluntary target to reduce nat. gas usage by 15%; Considering price caps for winter months
- Analysts anticipate WTI and Brent prices to increase to ~\$95-100/bbl. in Q4 2022; retreating slightly in 2023

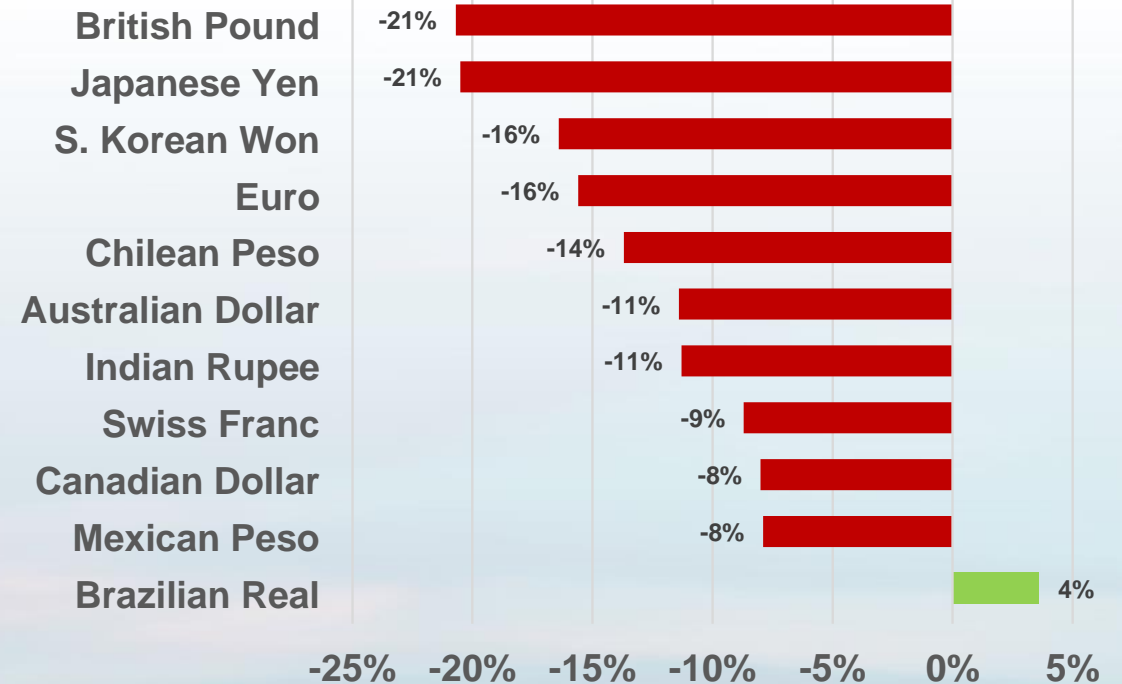
U.S. Dollar Raging Higher

Trade-Weighted U.S. Dollar



DXY Index: Euro, Yen, Pound, Cdn\$, S. Krona, Swiss Franc

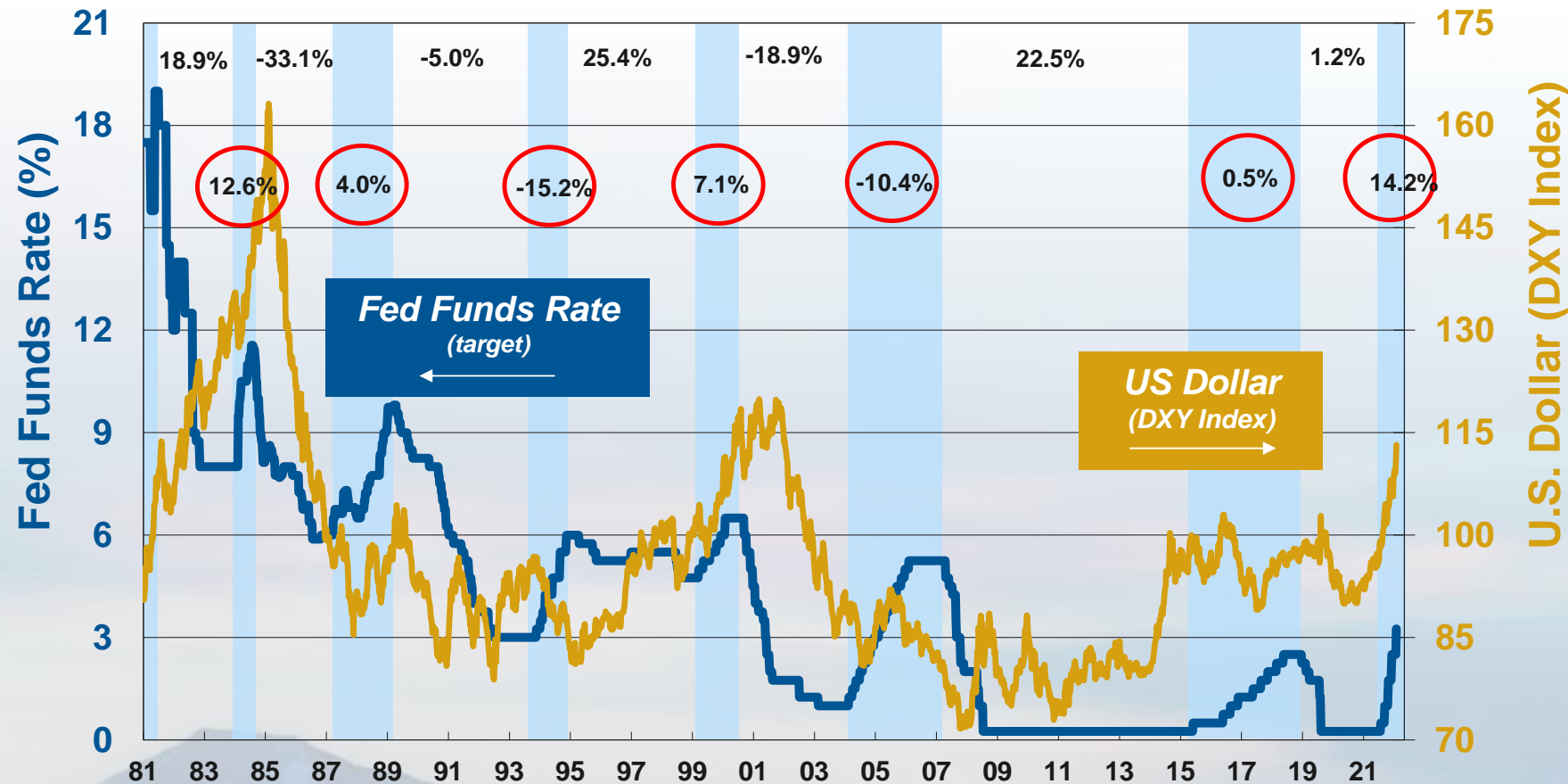
2022 YTD Change in Currency Values vs. U.S. Dollar



- Trade-weighted U.S. dollar has gained ~25% since June 2021 (nearly 17% 2022 YTD)
 - U.S. Fed has been relatively more aggressive with rate hikes
- Strong dollar is helping buffer domestic inflation, but creating havoc for fragile emerging market economies that must import food and energy

Fed Funds Rate Cycles and the US Dollar

Trade-Weighted U.S. Dollar & Fed Funds Rate Cycles



Source: Capitalight Research and Bloomberg; as of Sep. 28, 2022
DXI Index: Euro, Yen, Pound, Cdn\$, S. Krona, Swiss Franc

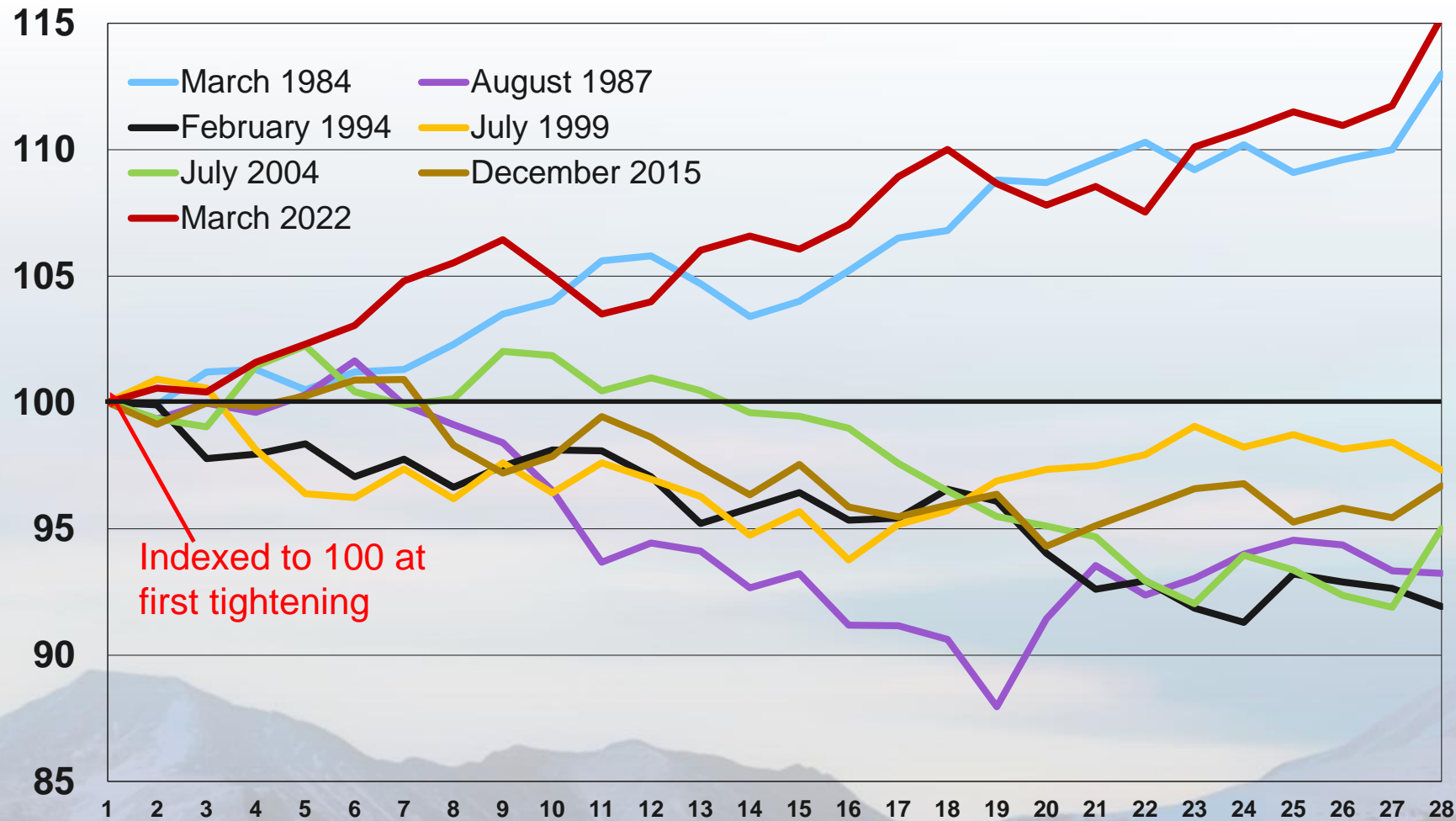
- Out of the last 8 rate hike cycles, the U.S. dollar has appreciated during 5
- The DXY Index is up ~14% since the current cycle commenced (28 weeks ago in March 2022)

Powered by Partnership

JP MORGAN CENTER FOR COMMODITIES + GLOBAL ENERGY MANAGEMENT

Fed Funds Rate Cycles and the US Dollar (cont.)

Trade-Weighted U.S. Dollar & Fed Funds Rate Cycles



- Currently, the appreciating U.S. dollar is receiving little attention
 - News is centered on inflation, Ukraine, midterms
- Anticipate more attention:
 - Unemployment climbs, increased recessionary fears, significant housing slump, continuing international hardship

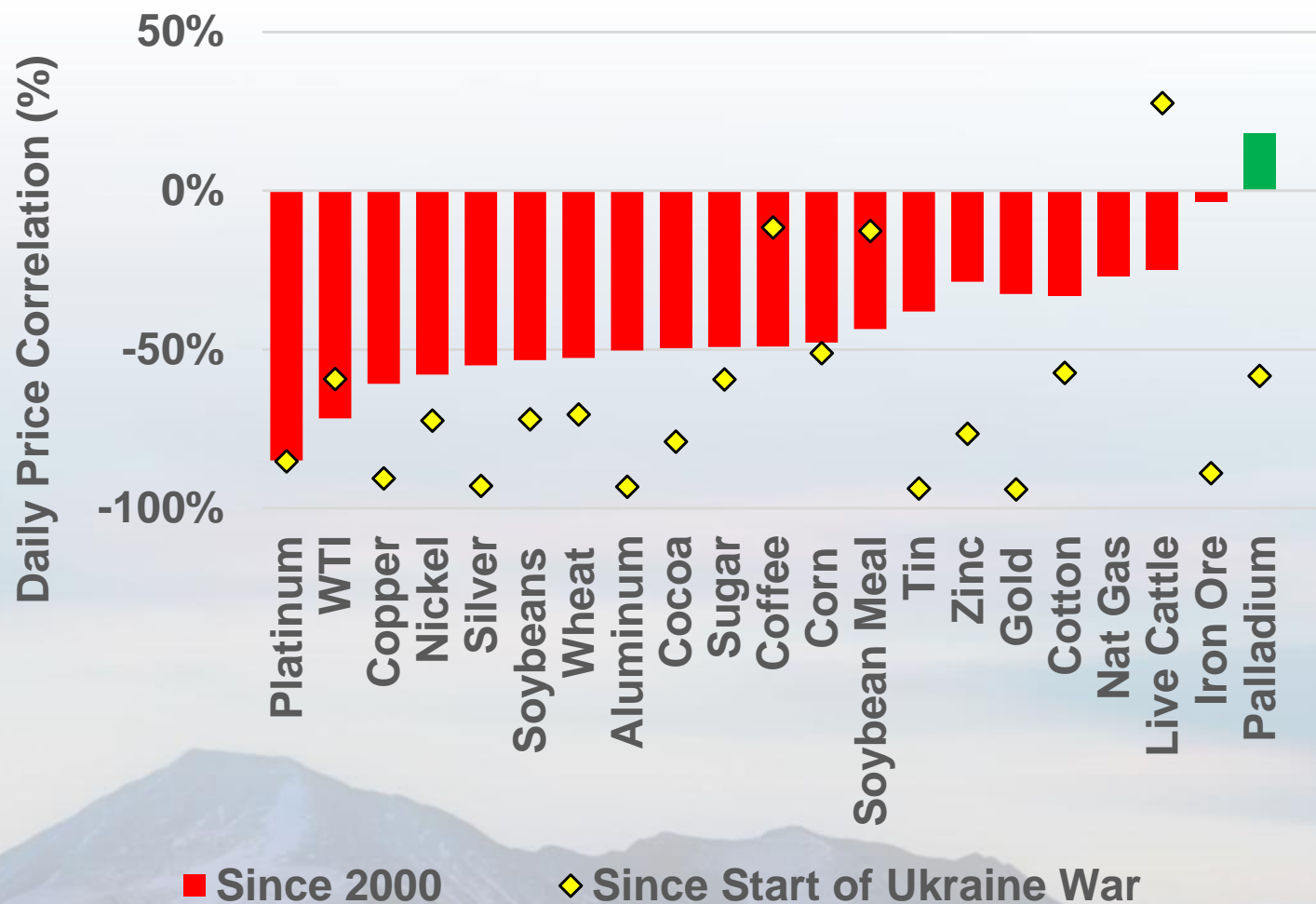
Source: Capitalight Research and Bloomberg; Weekly data

Powered by Partnership

JP MORGAN CENTER FOR COMMODITIES + GLOBAL ENERGY MANAGEMENT

Commodity Prices: U.S. Dollars

Commodities negatively correlated with the US\$



- Most commodities are priced in U.S. Dollars both here in the U.S. as well as around the world
- When the U.S. Dollar strengthens against other global currencies, this is typically bearish for commodity prices

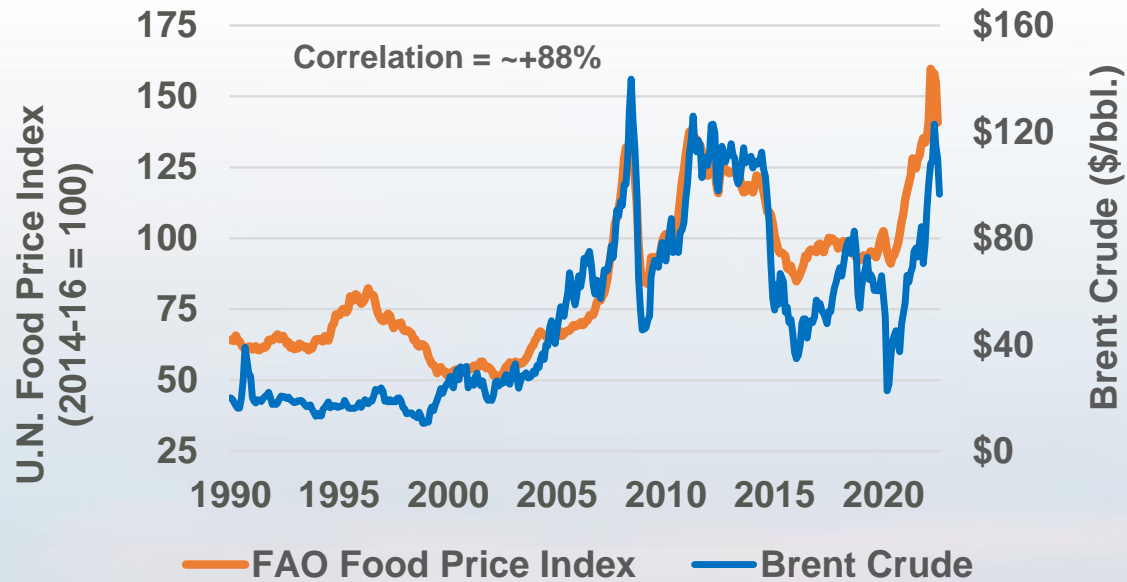
Daily price correlation (2000 onward); Source: JPMCC; Bloomberg

Powered by Partnership

JP MORGAN CENTER FOR COMMODITIES + GLOBAL ENERGY MANAGEMENT

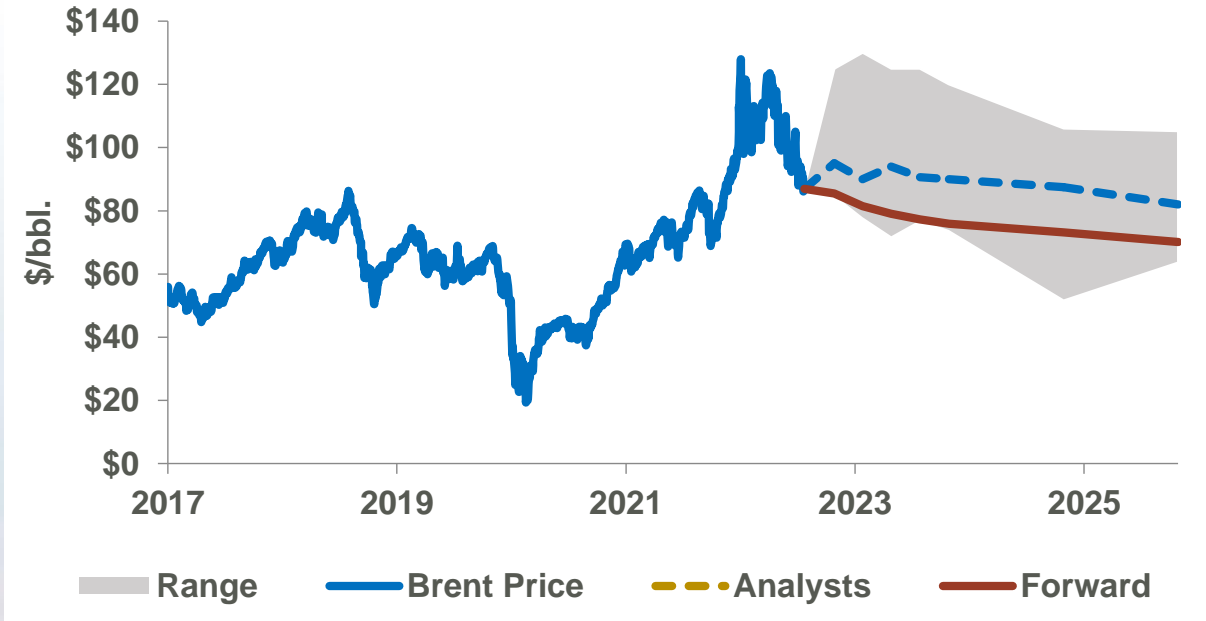
Energy & Food Outlook

Global Food and Crude Oil



Correlation based on monthly data (1990 onward); Source: JPMCC, Bloomberg

Outlook for Brent Crude



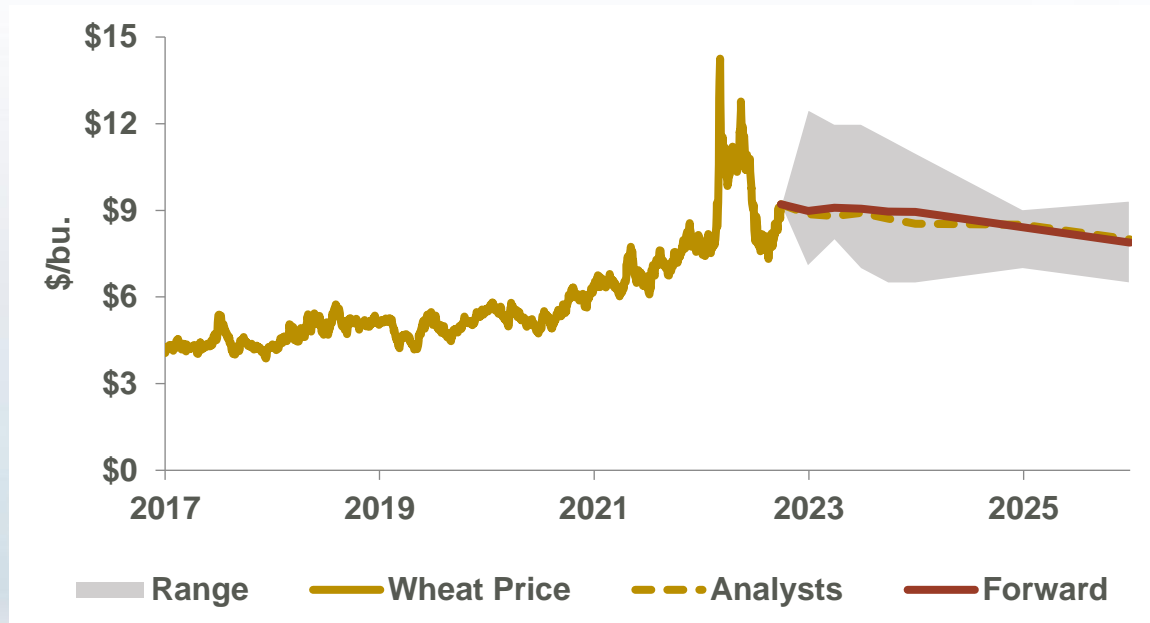
- Brent crude prices were nearly \$125/bbl. in early June 2022, currently ~\$91/bbl. (~30% decline)
 - Analysts anticipate prices to average \$95/bbl. in Q4 2022 and ~\$91/bbl. in 2023
- Strong correlation between Global food and Brent crude prices (~+88%)
- Food & Brent prices off recent peaks in June, but current oil prices are >35% higher than in 2019

Powered by Partnership

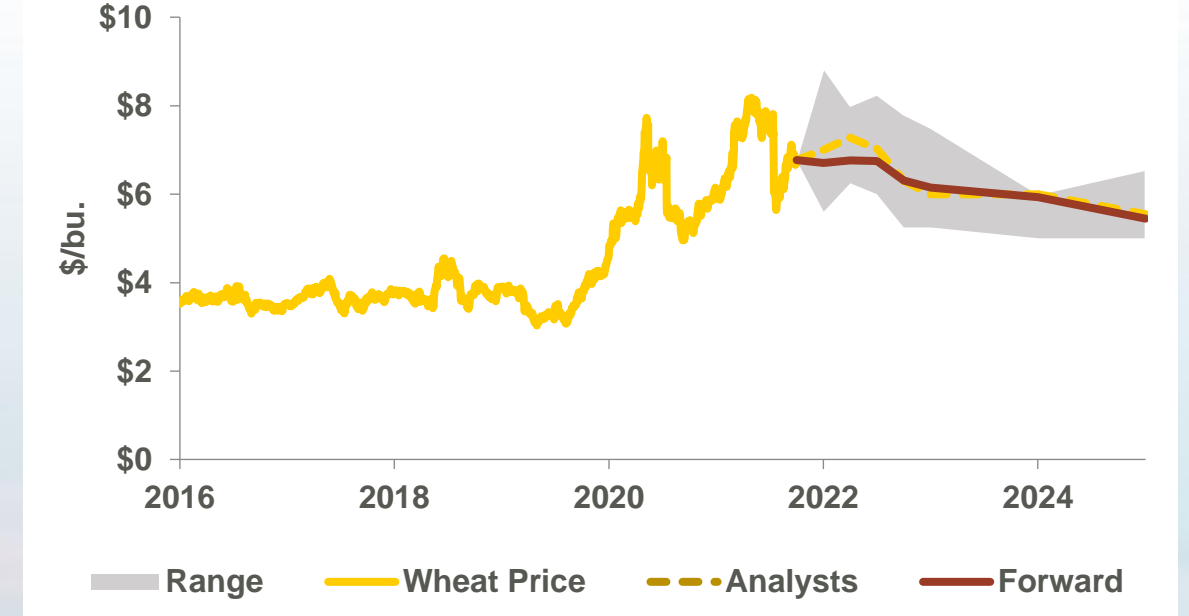
JP MORGAN CENTER FOR COMMODITIES + GLOBAL ENERGY MANAGEMENT

Wheat and Corn Outlook

Wheat Outlook



Corn Outlook



Source: JPMCC, Bloomberg

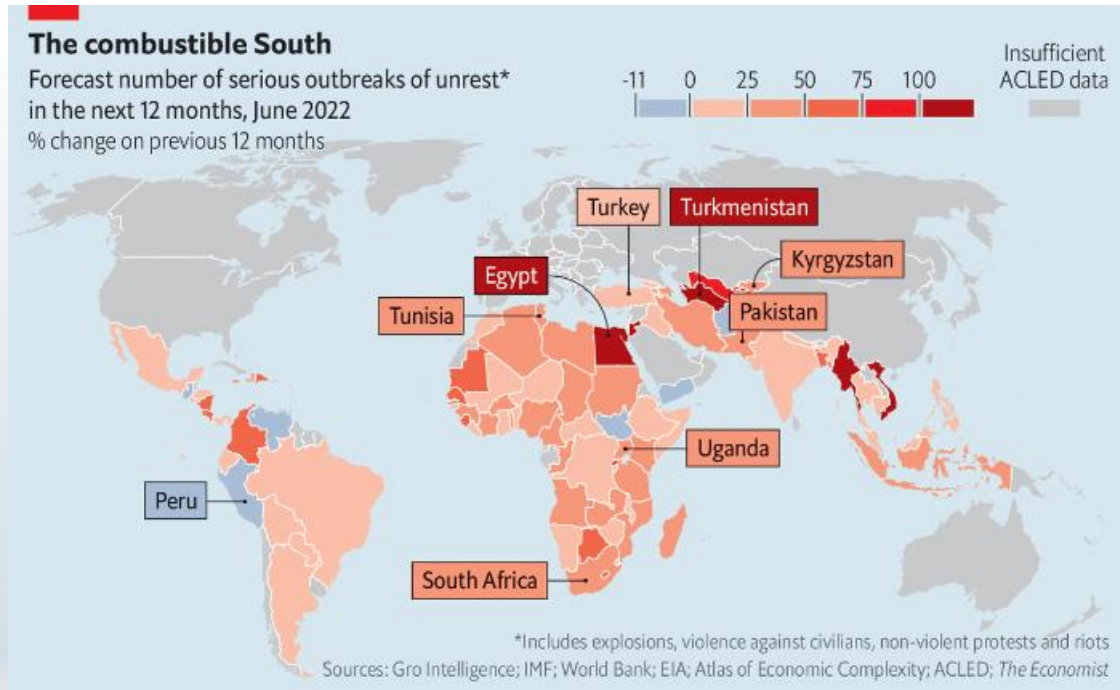
- Analysts anticipate wheat prices averaging ~\$9/bu. in Q4 2022. CBOT prices to average ~\$8.75/bu. in 2023, continuing moderate downward trend through 2025
- Corn to average ~\$7/bu. in Q4; ~\$6.65/bu. in 2023

Powered by Partnership

JP MORGAN CENTER FOR COMMODITIES + GLOBAL ENERGY MANAGEMENT

Outlook

Global Unrest Set to Increase



Source: Economist, June 23, 2022

- High food and energy prices to drive unrest outbreaks and increased political instability
- High government debt levels limit flexibility to mitigate impacts
- Average debt/GDP ratio for low income countries = ~70%
 - Lower GDPs will force these ratios higher

Powered by Partnership

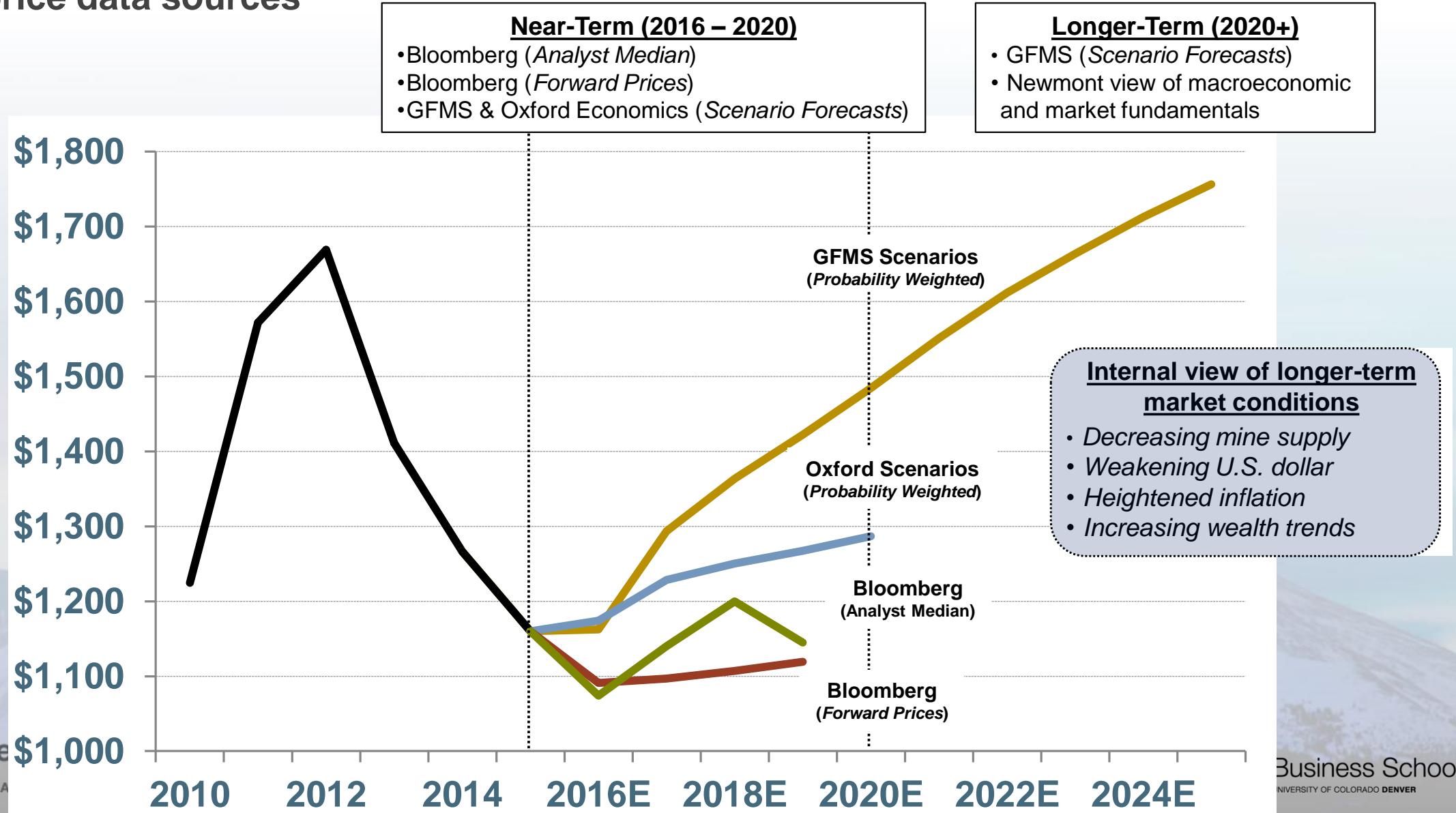
JP MORGAN CENTER FOR COMMODITIES + GLOBAL ENERGY MANAGEMENT

Conclusions

- Global food prices have moderately declined from peak in March, but are double over 2019 levels
- Key inputs of fertilizer and energy also off peaks from early Summer 2022, but are 165% and >35% higher vs. 2019
 - OPEC+ considering 1Mbpd cut (after 100Kbpd reduction in Sept).
- Global unrest and political instability to intensify under higher food, fertilizer and energy prices in 2023
- U.S. Fed rate hike cycle to continue
 - +50 bps in December 2022; 25 bps in March 2023
- U.S. dollar to remain high in 2023, weighing on commodity prices
- Over the longer-term, emerging economies to drive commodity markets and energy policy

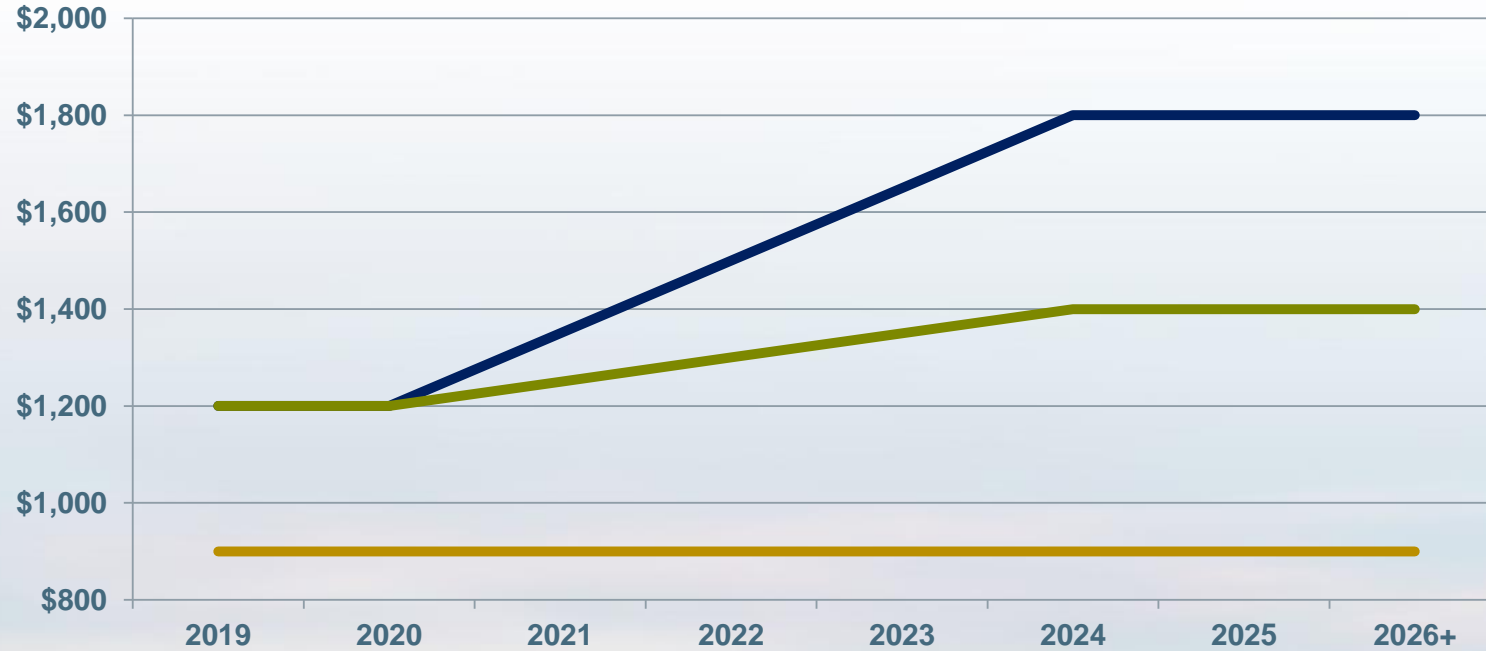
Commodity Price Forecasting:

Gold price data sources



Gold Price Assumptions (back in 2019...)

Gold Price Scenarios for Business Plans and Investment Analysis



- Near-term gold price: Current demand trends; analyst and economist views; statistical analysis
- Longer-term gold price: View of fundamental gold supply & demand and demographic trends
- Key FX and other financial assumptions based on economic logic to create scenarios

- Other Tips

- Keep it Simple (create distinct scenarios related to the business)
- Enforce consistent use across organization

– “...I am glad you have an opinion about the future, but you will use these assumptions!...”

Upcoming Commodity Education at the JPMCC

Professional Education

Leadership in Commodity Trade & Supply Networks

Partnership with Erasmus University, Singapore
Management University, JPMCC

Europe week: January 18-27, 2023

North America week: March 27-31, 2023

Asia week: June 19-23, 2023

Sustainable Commodities Production, Markets, and Supply Chain

January 30 – February 24, 2023

Masterclass in Commodities Hedging and Trading

Feb

Lifecycle of Oil and Natural Gas

April

Graduate Courses

- ESG Trends in Energy and Commodities (Jan. 2023)
- Foundations of Commodities (Jan. 2023)
- Commodity Supply Chain Management (Jan. 2023)
- Commodity Trading; Commodity Hedging (Mar. 2023)
- Commodity Carbon Markets (Apr. 2023)

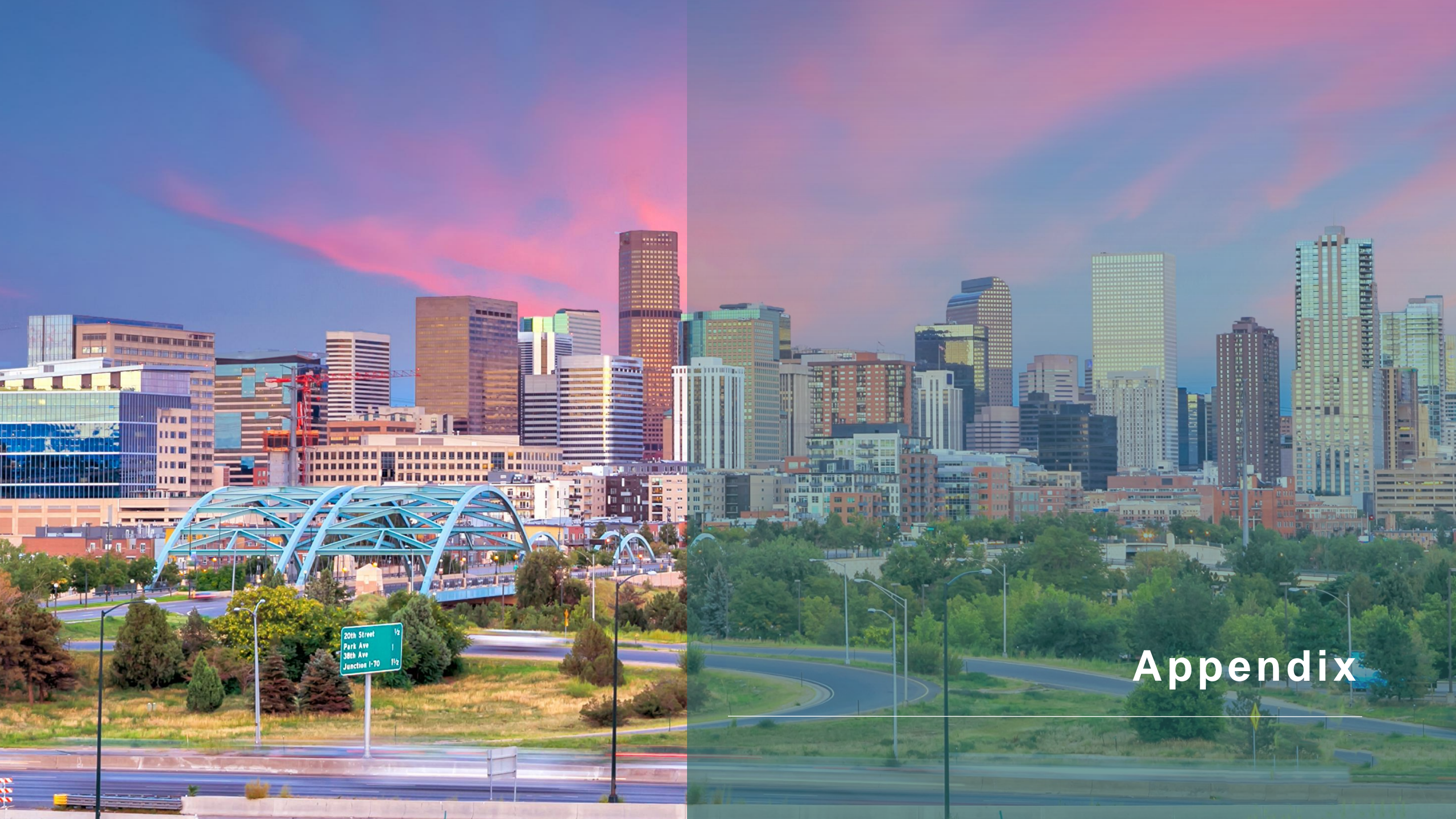
Undergraduate Courses

- The Future of Energy (Spring 2023)

For Information:

Tom Brady (tom.brady@ucdenver.edu)

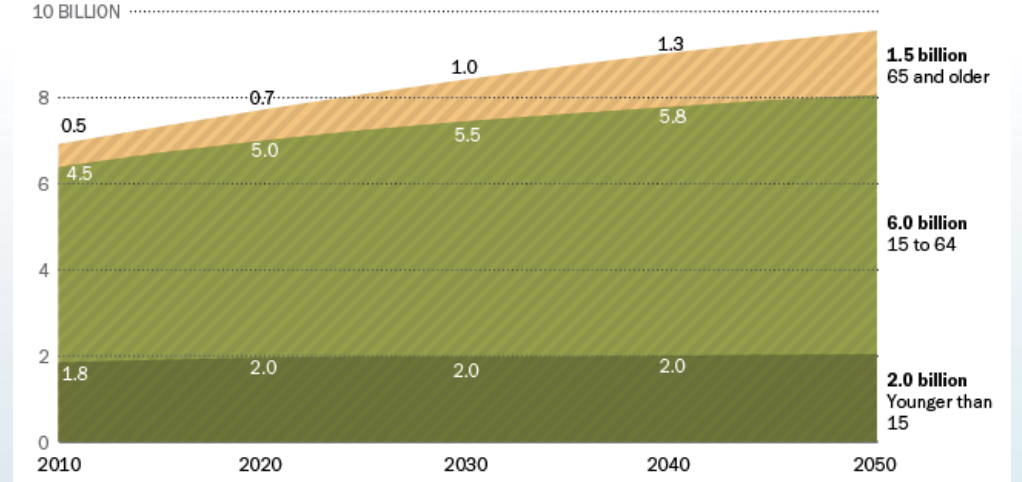
Erica Hyman (erica.hyman@ucdenver.edu)



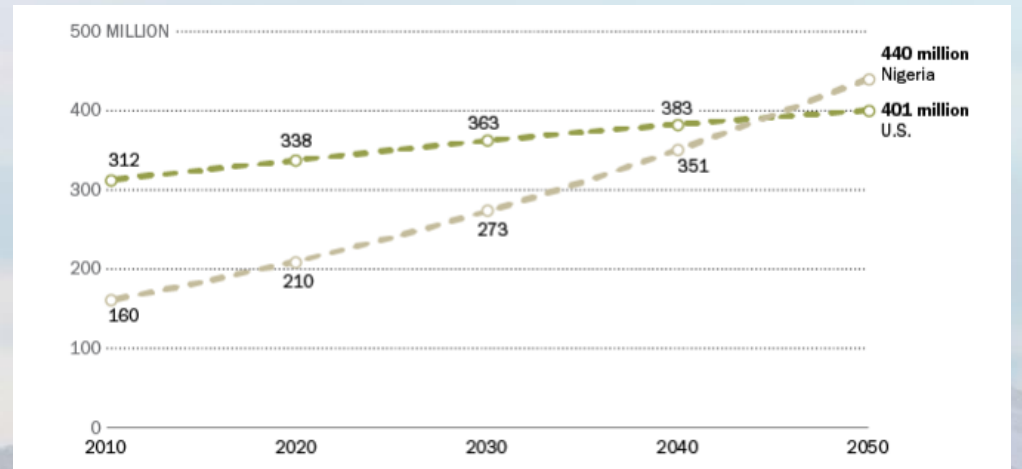
Appendix

Global Population: Projections

- Currently, there are **7.8** billion people living on earth
 - The United Nations projects the global total to grow to **~9.6** billion by 2050 (or by nearly 25%)
 - Over 60% will be between the ages of 15 to 64 years old
- Currently, there are nearly 340 million people living in the U.S.
 - This is expected to grow to over 400 million by 2050 (19%)
- Currently, **~1.39** and **~1.35** billion people live in China and India, respectively

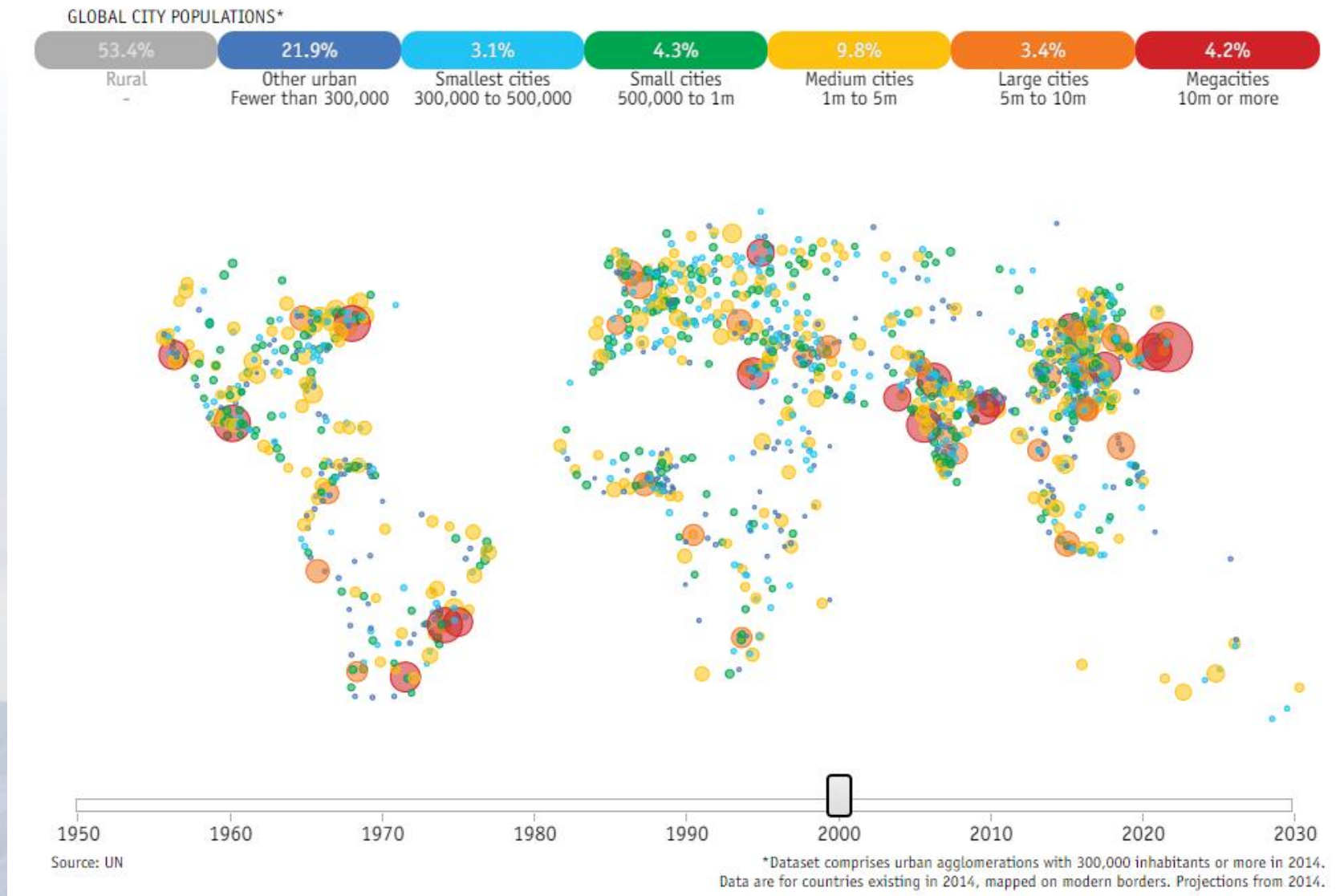


Projected U.S. Population



Source: U.N.

Global Population: Urbanization in 2000

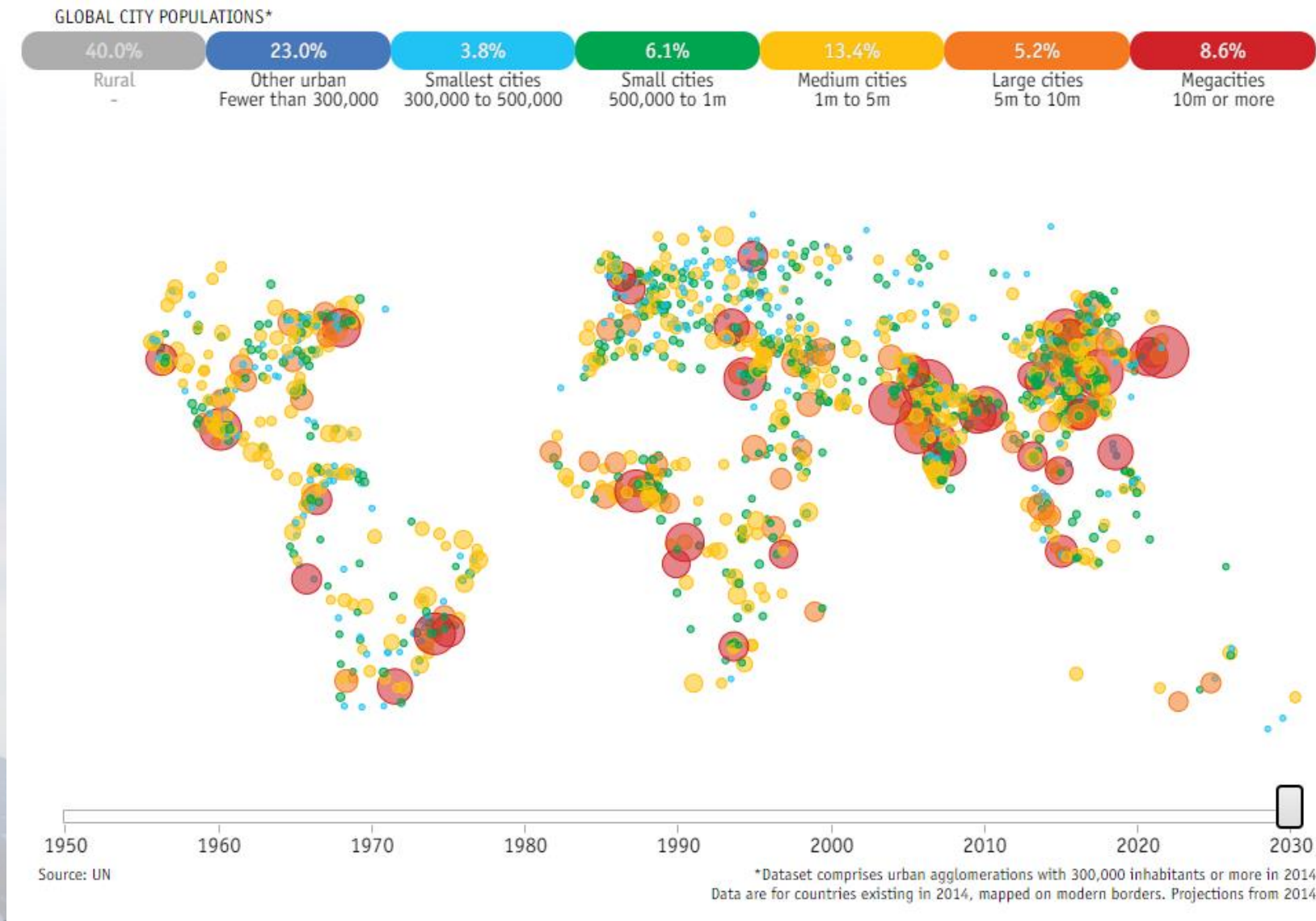


Powered by Partnership

JP MORGAN CENTER FOR COMMODITIES + GLOBAL ENERGY MANAGEMENT

Saad Rahim, Chief Economist, Trafigura; 2021 JPMCC Commodity Research Symposium

Global Population: Urbanization in 2030E



Powered by Partnership

JP MORGAN CENTER FOR COMMODITIES + GLOBAL ENERGY MANAGEMENT

Saad Rahim, Chief Economist, Trafigura; 2021 JPMCC Commodity Research Symposium

Global Population: Largest global cities (current)

Tokyo, Japan (~37.4M)



Dehli, India (~30.3M)



Shanghai, China (~27.1M)



San Paolo, Brazil (~22.0M)



Mexico City, Mexico (~21.8M)



Dhaka, Bangladesh (~21.0M)



Cairo, Egypt (~20.9M)



Beijing, China (~20.5M)



Source: Business Insider, 2016

Largest U.S. cities: New York: ~18.4M, Los Angeles: ~12.2M; Chicago: ~8.6M; Miami: 5.5M

Powered by Partnership

JP MORGAN CENTER FOR COMMODITIES + GLOBAL ENERGY MANAGEMENT

Saad Rahim, Chief Economist, Trafigura; 2021 JPMCC Commodity Research Symposium

Global Population: Largest global cities (2050E)

Mumbai, India (~42.4M)



Dehli, India (~36.2M)



Dhaka, Bangladesh (~21.0M)



Kinshasa, DRC (~35.0M)



Kolkata, India (~33.0M)



Lagos, Nigeria (~36.2M)



Tokyo, Japan (~32.6M)



Karachi, Pakistan (~31.7M)



Source: Business Insider, 2016

Largest U.S. cities (2050): New York: ~24.7M, Los Angeles: ~16.4M; Chicago: ~11.9M; Miami: 7.96M

Powered by Partnership

JP MORGAN CENTER FOR COMMODITIES + GLOBAL ENERGY MANAGEMENT

Global Population: Largest global cities (2100E)

Lagos, Nigeria (~88M)



Kinshasa, DRC (~83.0M)



Dar es Salaam, Tanzania (~74.0M)



Mumbai, India (~67M)



Dehli, India (~57M)



Khartoum, Sudan (~57M)



Niamey, Niger (~33.0M)




Dhaka, Bangladesh (~54.0M)



Source: Trafigura; The B1M, 2021

Powered by Partnership

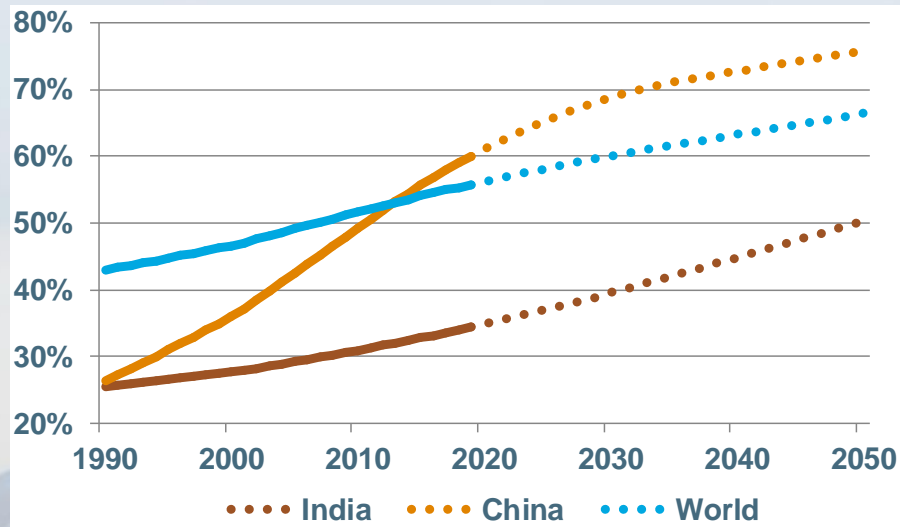
JP MORGAN CENTER FOR COMMODITIES + GLOBAL ENERGY MANAGEMENT

 **Business School**
UNIVERSITY OF COLORADO DENVER

Commodity Demand: Urbanization & Wealth

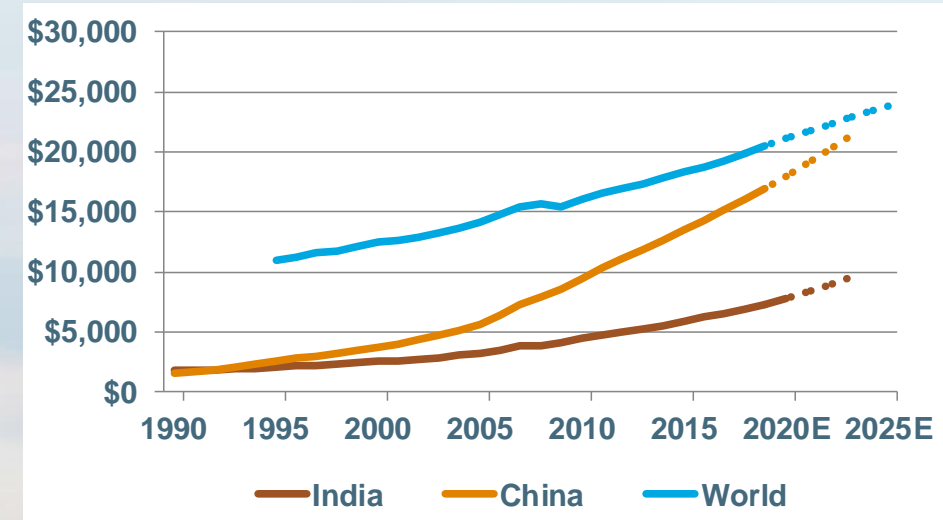
- Current urbanization in China ~60%
 - Expected to climb toward OECD average of ~80% by mid-century
- Urbanization in India currently ~30%, to climb over 50% next 30 years
- Per capita wealth trending up in India and China and Globally
 - Per capita income in the U.S. = ~\$60K; China = ~\$17K, India = ~\$7K

Urbanization expected to progress



Source: U.N. Projections

Per capita wealth also trending upward



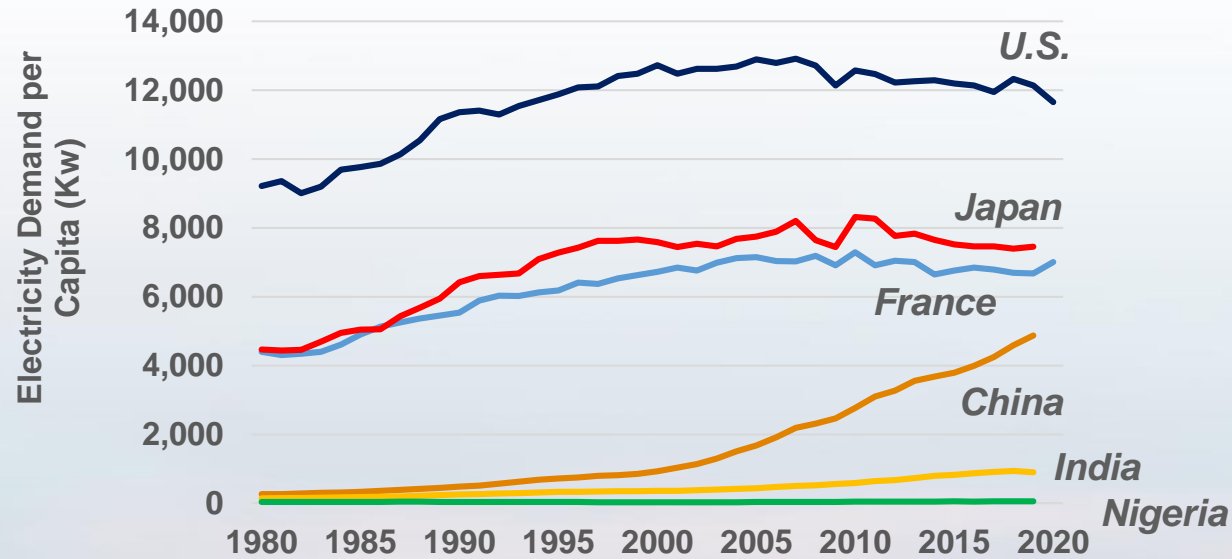
Source: IMF World Economic Outlook

Powered by Partnership

JP MORGAN CENTER FOR COMMODITIES + GLOBAL ENERGY MANAGEMENT

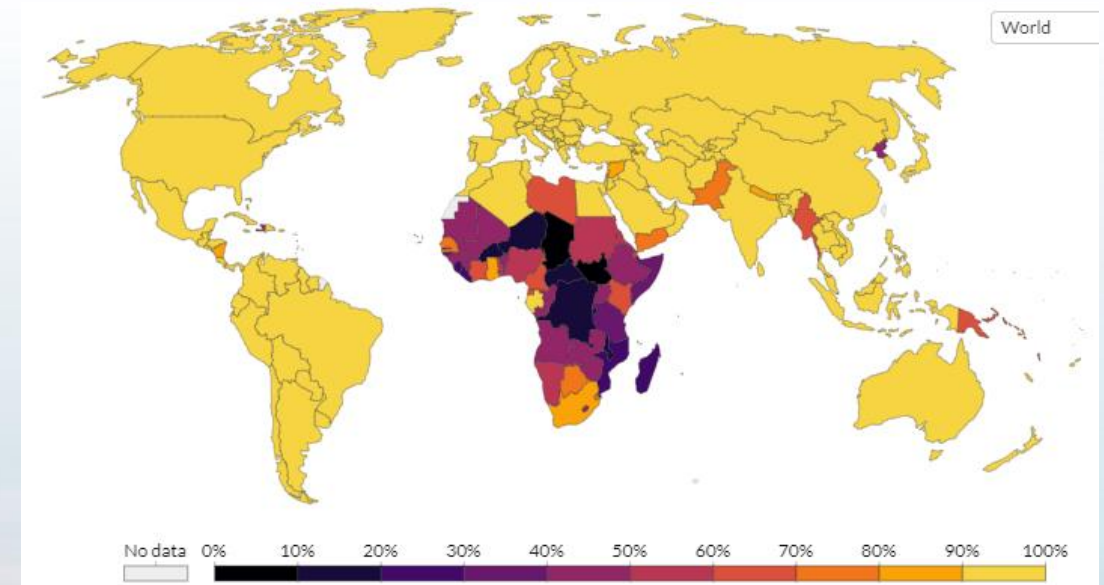
Commodity Demand: Electricity & Copper

Per Capita Electricity Demand



Source: <https://countryeconomy.com/energy-and-environment/electricity-consumption>

Access to Electricity



Source: U of Oxford

- Each American citizen uses an average of ~12MW of electricity per year; Chinese: ~5MW; Indians: ~0.9; Nigerians: ~0.06.
- Primarily in Africa, there are ~750M people without access to electricity (~1.2B in 2010)
- ~39% of global copper demand is in electrical & electrical components; >30% of copper is in the building & construction;



THANKS

JP MORGAN CENTER FOR COMMODITIES + GLOBAL ENERGY MANAGEMENT

Powered by Partnership

JP MORGAN CENTER FOR COMMODITIES + GLOBAL ENERGY MANAGEMENT

 **Business School**
UNIVERSITY OF COLORADO DENVER