Why should we examine all commodities together?

- Nature of the commodity
  - Renewable (crops or trees) vs. non-renewable
- Ownership and market concentration
  - Smallholders for agriculture, large corporations or governments for extractives
- Response to income
  - Largest for metals, smallest for food
- Role of technology
  - Varying productivity gains across commodity groups
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Heterogeneity leads to different price behavior and requires tailored policies
Outline of the volume and contributors

Foreword
David Malpass, World Bank President

Overview
John Baffes and Peter Nagle

Chapter 1: The Evolution of Commodity Markets Over the Past Century
John Baffes, Wee Chian Koh, and Peter Nagle

Chapter 2: Commodity Demand: Drivers, Outlook, and Implications
John Baffes and Peter Nagle

Chapter 3: The Nature and Drivers of Commodity Price Cycles
Alain Kabundi, Garima Vasishttha, and Hamza Zahid

Chapter 4: Causes and Consequences of Industrial Commodity Price Shocks
Alain Kabundi, Peter Nagle, Franziska Ohnsorge, and Takefumi Yamazaki
Evolution
Commodity demand has soared over the past 50 years

Commodity demand, population, and GDP growth, 1970-2020

Percent change since 1970

Sources: BP Statistical Review; USDA; World Bureau of Metals Statistics; World Bank
Commodity demand has several drivers…

- Population growth
- Income growth
- Industrialization & urbanization
- Technology & innovation
- Substitution
- Policies
- Preferences
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Commodity demand growth changes as income rises...

**Metal consumption and income per capita**

<table>
<thead>
<tr>
<th>Year</th>
<th>China</th>
<th>G7</th>
<th>Korea, Rep.</th>
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<td>1965</td>
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<tr>
<td>2019</td>
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**Energy consumption and income per capita**

<table>
<thead>
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**Source:** Source: Authors’ calculations; BP Statistical Review of World Energy; World Bank.

Note: LHS: shows base metal demand per capita and GDP per capita (MER) from 1965 to 2019. RHS: shows energy demand per capita.
reflecting income-varying income elasticities of demand

Aggregate income elasticity estimates

Source: Authors' calculations; BP Statistical Review of World Energy; World Bank.
Notes: estimates of global income elasticity of demand from an ARDL model with PMG estimators. Sample of up to 63 countries from 1970 to 2019.
...reflecting income-varying income elasticities of demand

**Aggregate income elasticity estimates**

Source: Authors’ calculations; BP Statistical Review of World Energy; World Bank. Notes: estimates of global income elasticity of demand from an ARDL model with PMG estimators. Sample of up to 63 countries from 1970 to 2019.
Industrialization, urbanization have driven metal demand in China

Global metal consumption

- Advanced economies
- EMDEs excl. China
- China

Source: World Bureau of Metal Statistics; World Bank
Note: Refers to consumption of base metals only. EMDE = Emerging Markets and Developing Economies.
In the race to industrialization, the speed of China’s rise is unique

**Share of global copper demand**

*Percent of global*


**Notes**: Share of country or country group in world total. Share of global consumption plotted as 3-year moving average to improve readability. Where consumption is not available, apparent consumption (production + imports - exports) is used. Where there is missing data, especially in the earlier years, linear interpolation is applied. Data from 1850 to 2020.
Commodity demand has several drivers…

- Population growth
- Income growth
- Industrialization & urbanization
- Technology & innovation
- Substitution
- Policies
- Preferences
Technology and innovation led to huge increases in productivity

Maize yields in the United States

Metric tons per hectare

Production is linked to energy

Source: U.S. Department of Agriculture
As new fuels have emerged, energy use has grown steadily.

**Global energy use**

Source: BP Statistical Review; Energy Information Administration; World Bank

Note: Renewables includes hydro-electric, solar, wind, geothermal, biomass, wave and tidal.
Technology has also triggered major commodity transitions…

Global shipping fleet, by type of fuel

Number of ships, thousands

Source: Lloyds register; World Bank.
Note: Figure shows the number of commercial vessels by type of fuel.
...across a range of different industries

World textile consumption

Percent of total

Sources: Authors calculations
Commodity demand has several drivers…

- Population growth
- Income growth
- Industrialization & urbanization
- Technology & innovation
- Substitution
- Policies
- Preferences
National policies have had different objectives

- Resource security (promoting domestic production, facilitating trade deals)
- Self-sufficiency (centrally planned economies)
- Producer income support (U.S. farm bill)
- Consumer protection (energy subsidies)
- Environmental or health concerns (phase-out of harmful products)
- Overall income redistribution (royalties, sovereign wealth funds)
Policies can trigger major shifts in patterns of supply/demand

**Lead consumption in the United States**

- Thousand metric tonnes
- 1975 - 2017
- Gasoline additives (blue)
- Paint and glass pigments (red)

**Biofuel production**

- Mb/d
- 1990 - 2020
- OECD (blue)
- Non-OECD (red)

**Sources:** BP Statistical Review of World Energy; U.S. Department of Commerce; U.S. Geological Survey; World Bank.
Supply management schemes aimed to manage commodity market volatility

Almost 40 agreements since early 1900’s

Pre—WWII: some successes
  - Copper and coffee were successful, had limited objectives and sunset clauses

Post—WWII: failures
  - Agreements were too broad, attempted to manage both producers and consumers

Only OPEC survives today
  - Required broader support (OPEC+)
Supply management schemes aimed to manage commodity market volatility

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Only OPEC survives today
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Changes in prices after agreements collapse

Percent


Sources: World Bank.
Note: The change is based on the 3-year nominal average before and after the year of the collapse of the agreement. The year of collapse is noted in the parenthesis and is excluded from the comparison.
Challenges
Crude oil prices show repeated boom-and-bust cycles

Source: BP Statistical Review; World Bank.
Notes: Oil prices refers to U.S. average (1900-1944), Arabian Light (1945-1983), and Brent (1984-2022, August). Price series was deflated with the U.S. consumer price index, 2020 base.
Copper prices volatile and cyclical

Notes: Price series was deflated with the U.S. consumer price index, 2020 base.
Food prices have seen a long-term downward trend

Real maize and wheat prices

Notes: Price series was deflated with the U.S. consumer price index, 2020 base.
Commodity prices have seen common cycles...

Medium-term cyclical component of prices

Log scale

Source: Baffes and Kabundi (2021); World Bank.
Note: Charts show the medium-term component of the commodity price indexes, decomposed using a frequency domain approach (frequency of 8-20 years.)
...while long-term trends are markedly different

Long-term (trend) component of prices

Weighted index, January 1970 = 100

Source: Baffes and Kabundi (2021); World Bank.
Note: Chart show the permanent component of the commodity price indexes, decomposed using a frequency domain approach (frequency of greater than 20 years.)
Price shocks exert heterogenous impact on commodity exporters

Changes in output growth following commodity price increases and decreases

Sources: Authors calculations
Note: Cumulative impulse responses of output growth from a local projection estimation. Dependent variable is output growth after 10 percentage point change in oil/metals price growth. Yellow lines are coefficient estimates and dotted lines are 95 percent confidence bands. Estimated accounting for asymmetric effects of price increases and price declines.
Policy tools and future issues
Need a wide policy toolkit to respond to heterogenous challenges

➢ Commodity prices behave very differently and need tailored policies

➢ Shocks also affect prices differently at different time horizons
  ▪ Short-term volatility: *look through shocks, use fiscal & monetary policy tools*
  ▪ Medium-term shocks: *may need structural policy adjustments*
  ▪ Long-term trends: *economic diversification, invest in new sources of growth, asset diversification (e.g. sovereign wealth funds)*

➢ Commodity exporters will face evolving challenges in the future due to the energy transition and climate change
Sector-specific challenges: Energy

- **Demand**: Fossil fuel demand likely to decline as the energy transition unfolds.

- **Energy access**: Many people still lack energy access, however, and demand for energy is likely to rise with growing populations and incomes.

- **Geopolitics**: May delay the transition in the short term but accelerate it long-term.

- **Investment**: Large-scale investments will be needed for the energy transition.

- **Technology**: New innovations will be needed, e.g. in batteries, hydrogen.

- **Governments**: Important role to play to set the right incentives to manage the transition (tax vs. subsidy).
Sector-specific challenges: Metals and food

**Metals**
- **Consumption**: Rising demand as renewable energy sources are metals-intensive.
- **Production**: Challenges of sufficient supply and extracting in a sustainable manner.
- **Windfalls**: Metal exporters will need to manage potential windfalls.
- **Concentration**: Metal ores concentration is higher compared to e.g. oil reserves.

**Food**
- **Food insecurity**: Still a major problem, especially in low-income countries.
- **Food waste**: At the production stage (low-income countries) and consumption (high income levels).
- **Biofuels**: Account for 3-4% of arable land but contribute only 0.7% to energy consumption.
- **Climate change**: Could have severe effects & cause major shifts in patterns of production.
Commodity Markets Outlook

Pandemic, war, recession: Drivers of aluminum and copper prices

Commodity Markets

Evolution, Challenges, and Policies

Global Economic Prospects

www.worldbank.org/commodities