



PIIE PETERSON INSTITUTE FOR
INTERNATIONAL ECONOMICS

Global Supply Chain Disruptions

Global Economic Prospects: Spring 2022

Chad P. Bown

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1750 Massachusetts Avenue, NW | Washington, DC 20036 | www.piie.com

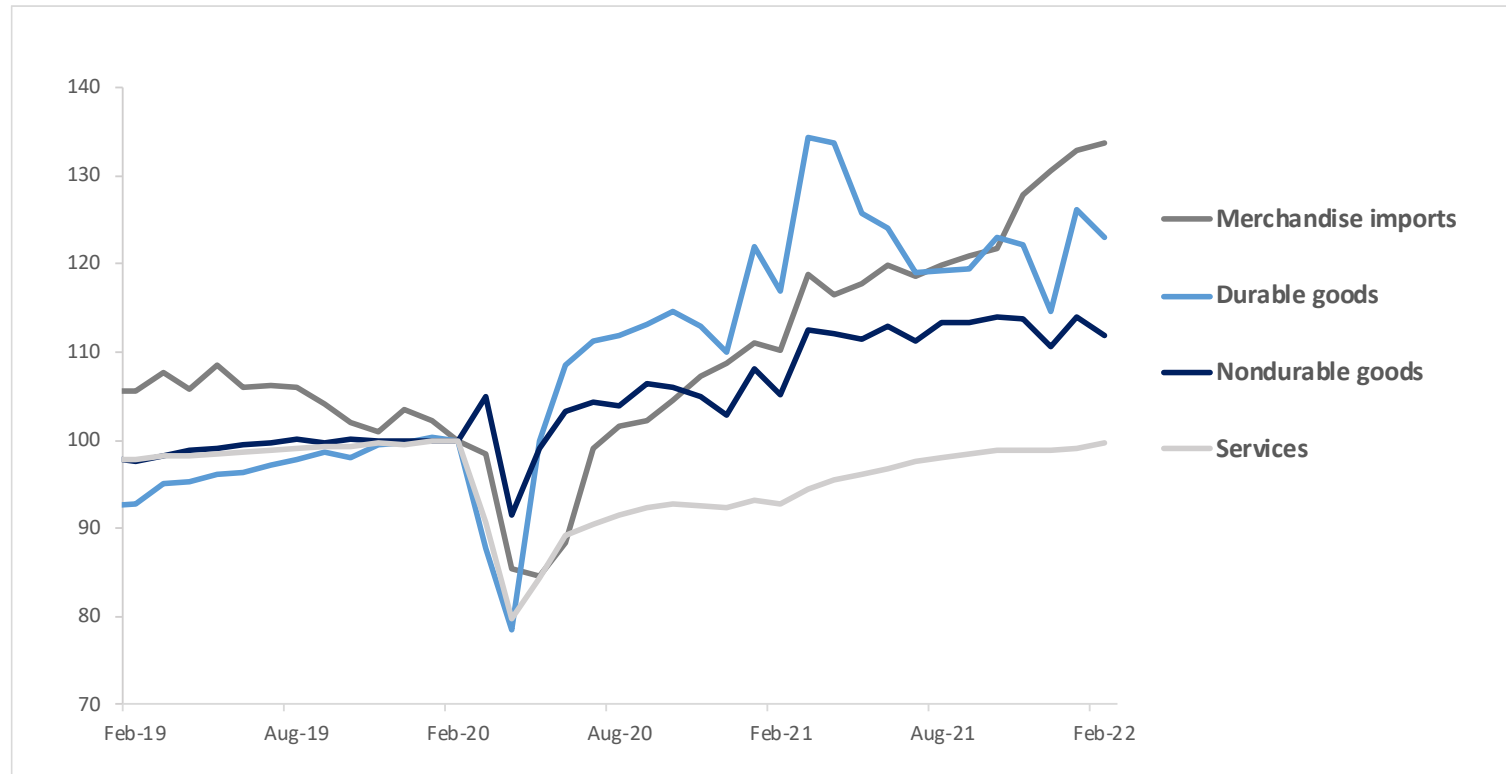
Outline

- Macro sources of supply chain disruptions
- Sectoral example: Autos / Semiconductors
- Ongoing shocks: Russia sanctions, China's COVID-19 lockdowns

Macro Sources of Supply Chain Disruptions

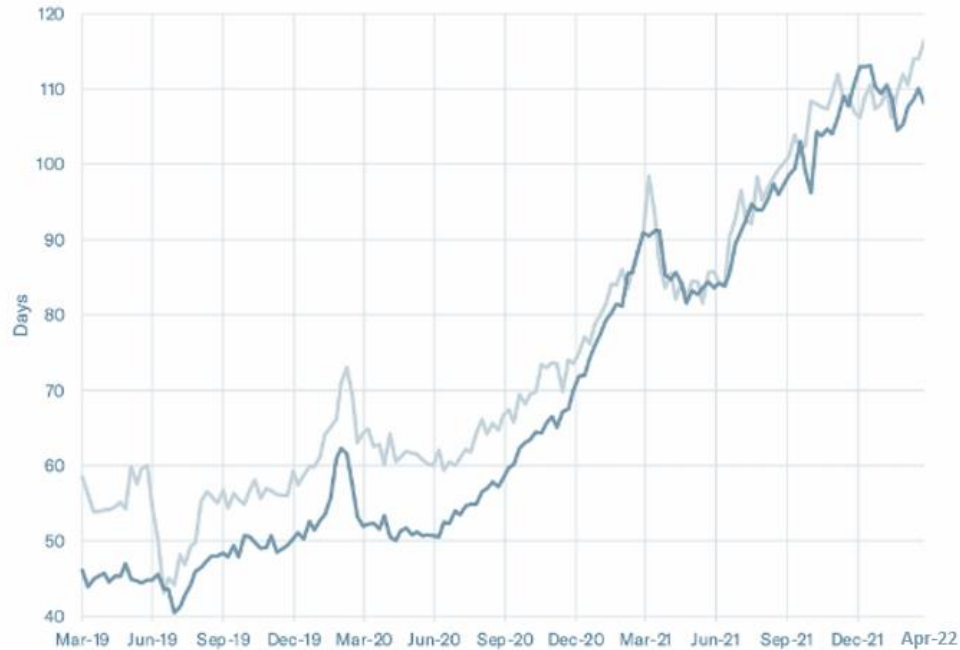
U.S. Personal Consumption Expenditures & Imports, Jan 2019 – Feb 2022
(Index Feb 2020 = 100)

Source: FRED

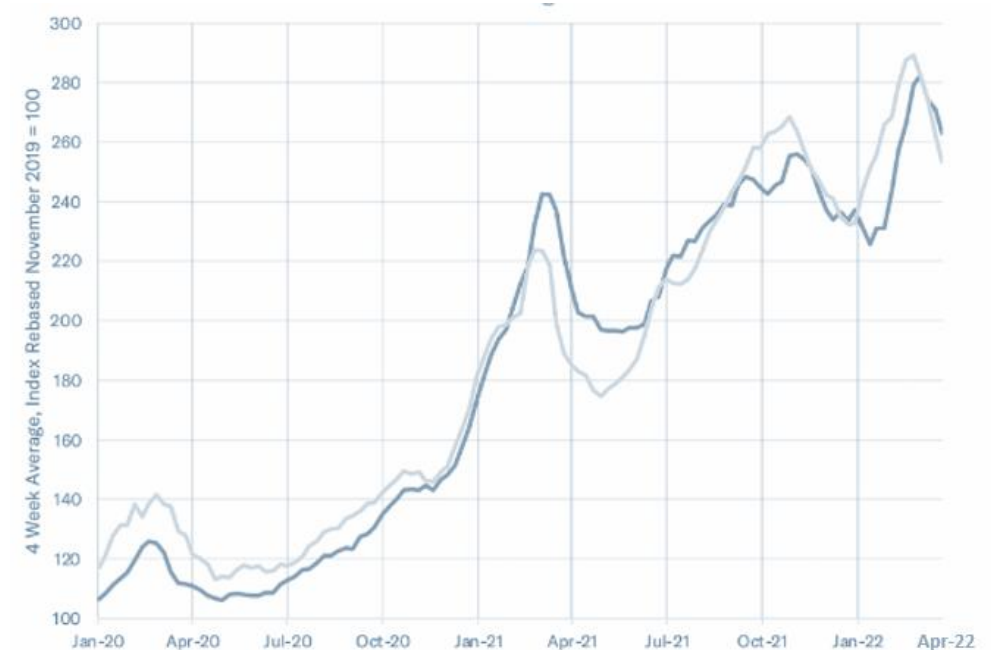


Shipping delays have not yet been resolved

Overall? Cargo ready date to destination port departure, Mar 2019 – Apr 2022



Within China? Cargo ready date to origin port departure, Jan 2020 – Apr 2022



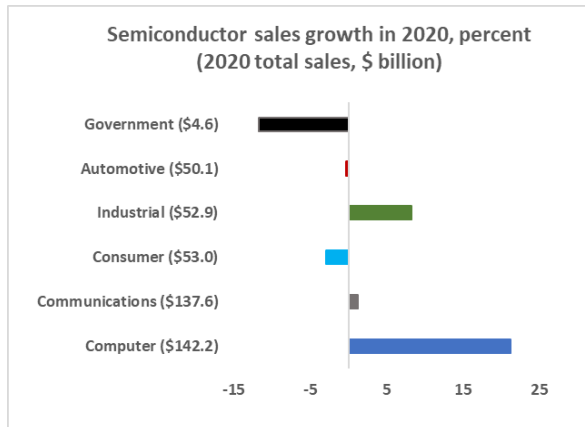
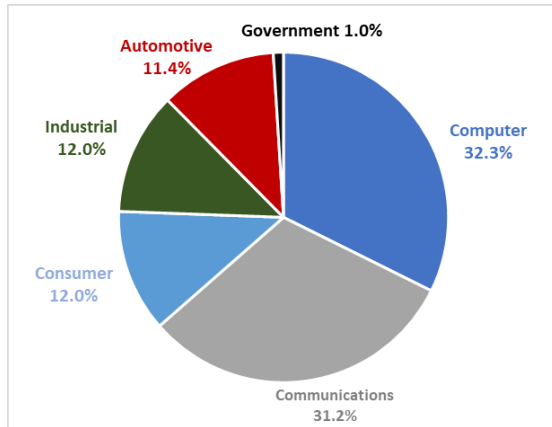
Ocean Timeliness Indicator Definition:

Time taken to transit from the "Cargo Ready Date" at exporters' gate to the "Destination Port Departure Date" when products are ready to leave the port to go to importers. Measures are shown for Far East Westbound (e.g. China-to-Europe) and Transpacific Eastbound (e.g., China-to-US) routes.

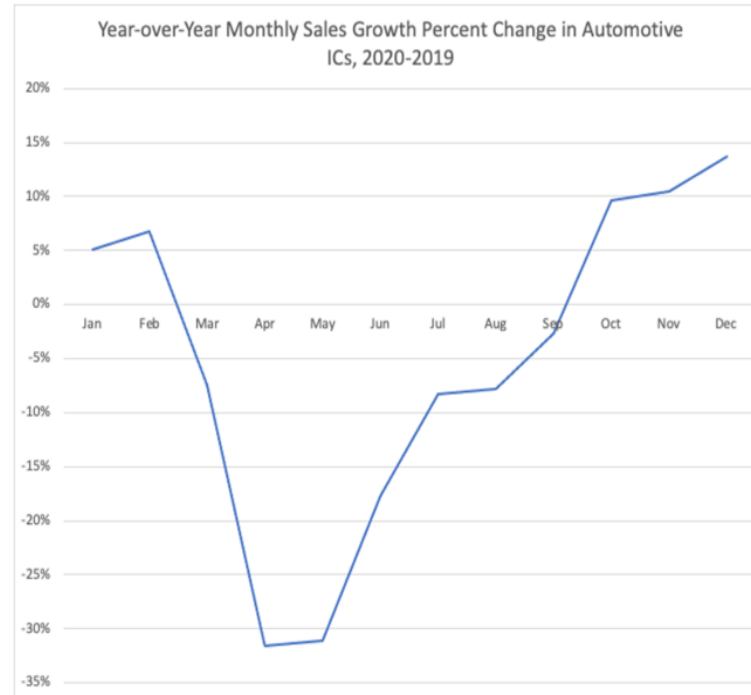
Source: Flexport. 2022. [Ocean Timeliness Indicator](#).

Autos and Semiconductors during the pandemic

End-users of chips

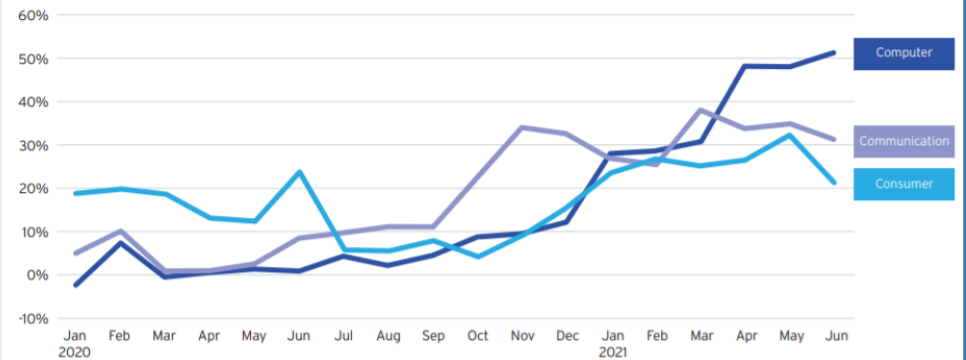


Automakers stopped buying chips in April-June 2020 when the pandemic hit...



...but demand switched over to other end-users

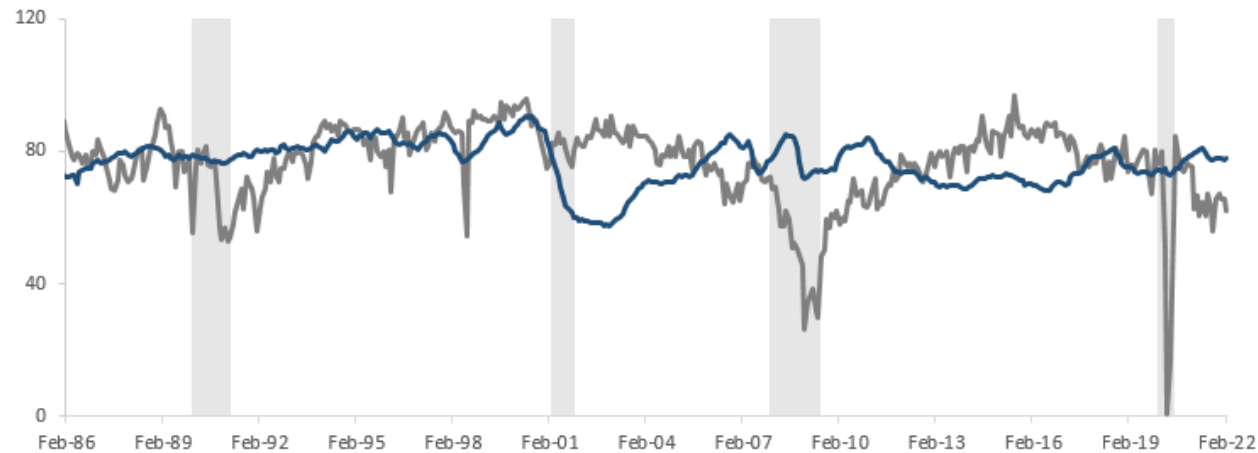
YEAR-OVER-YEAR MONTHLY CHIP SALES GROWTH TO MAJOR CONSUMER SECTORS RAPIDLY INCREASED



Sources: Semiconductor Industry Association. 2021. [Semiconductor Shortage Highlights Need to Strengthen U.S. Chip Manufacturing, Research](#), February 4.

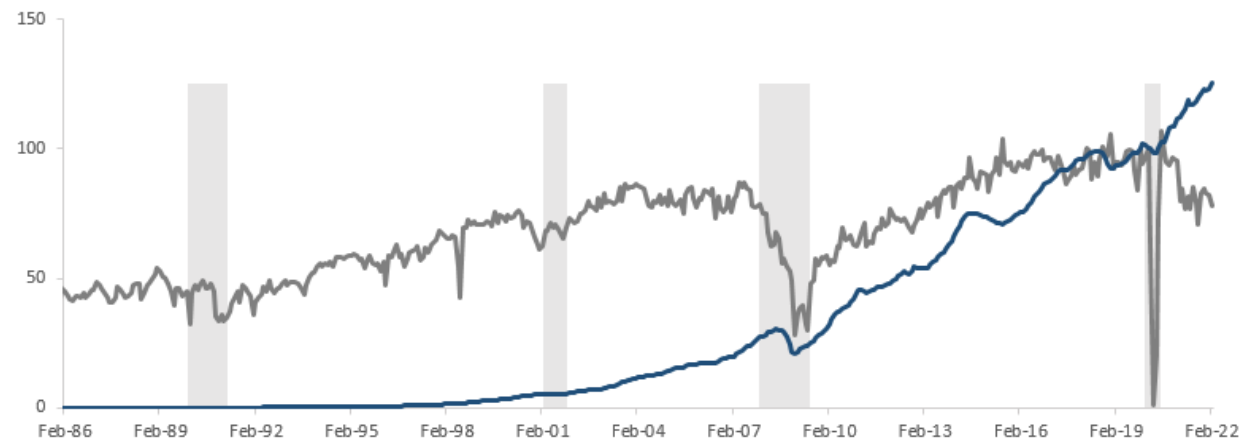
Semiconductor Industry Association. 2021. [2021 State of the U.S. Semiconductor Industry](#).

US autos and semiconductors over the long run



U.S. Capacity Utilization, January 1986 – February 2022, percent

— Semiconductors
— Autos

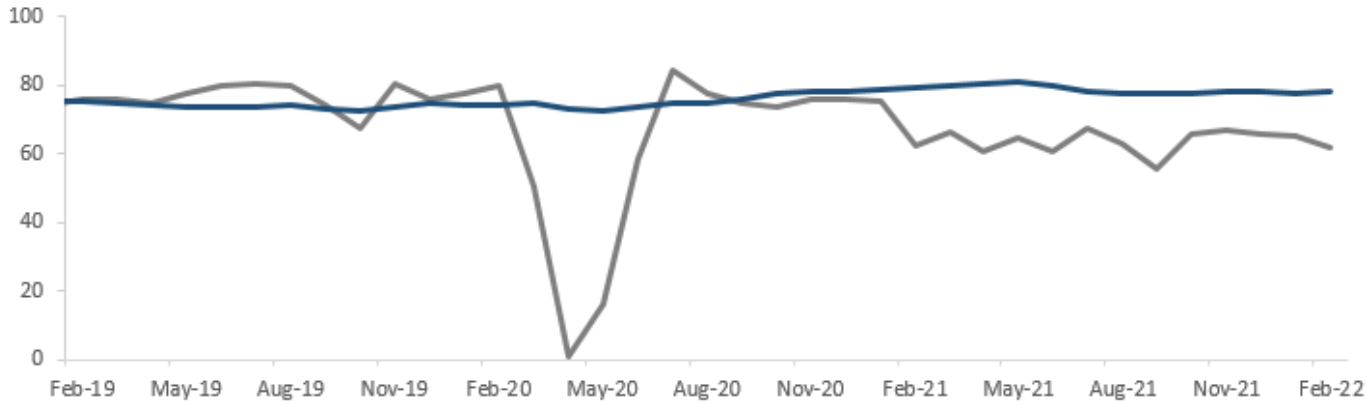


U.S. Industrial Production, January 1986 – February 2022 (Index February 2020 = 100)

— Semiconductors
— Autos

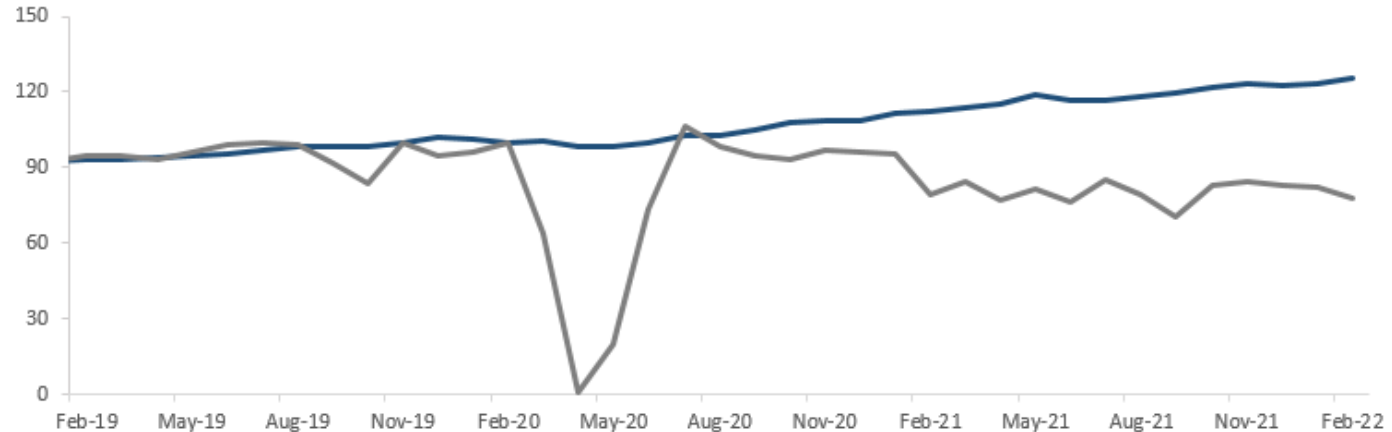
Source: FRED.

US autos and semiconductors during the pandemic



U.S. Capacity Utilization, January 2019 – February 2022, percent

— Semiconductors
— Autos



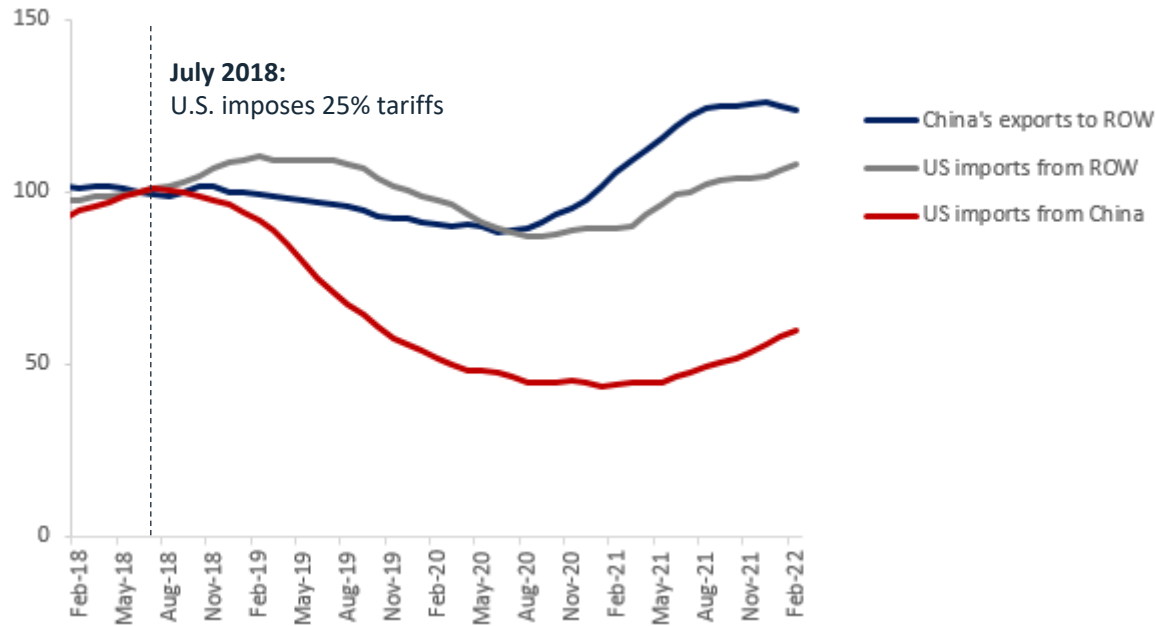
U.S. Industrial Production, January 2019 – February 2022 (Index February 2020 = 100)

— Semiconductors
— Autos

Source: FRED.

Semiconductor trade and the US-China Trade War

Semiconductor import and export volumes, January 2018 – February 2022
(12-month trailing sum, index June 2018=100)

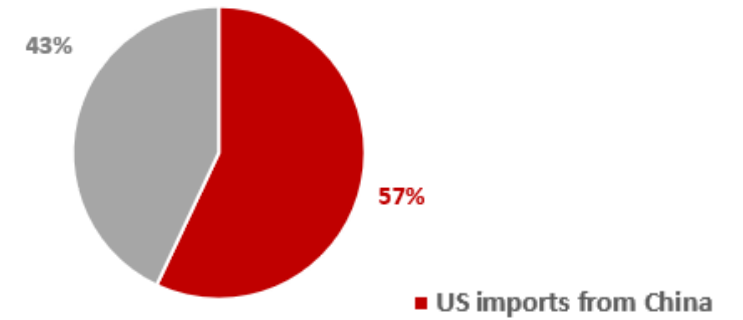


Source: Census, Chinese Customs.

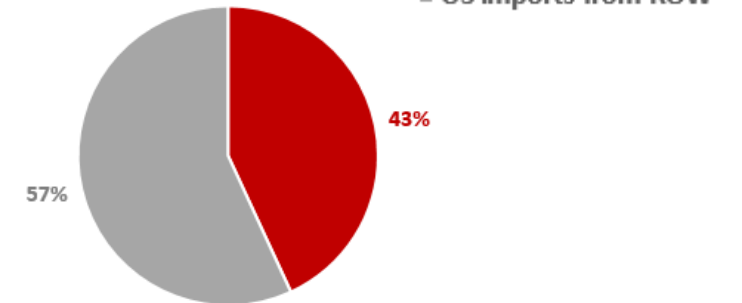
Note: Semiconductors defined as HS code 8541 (Diodes, transistors and similar semiconductor devices), without 8541406020 and 8541406030 (US) or 85414020 (China) which are cells for solar panels,

US imports of semiconductors, by volume...

...in 2017



...in 2021



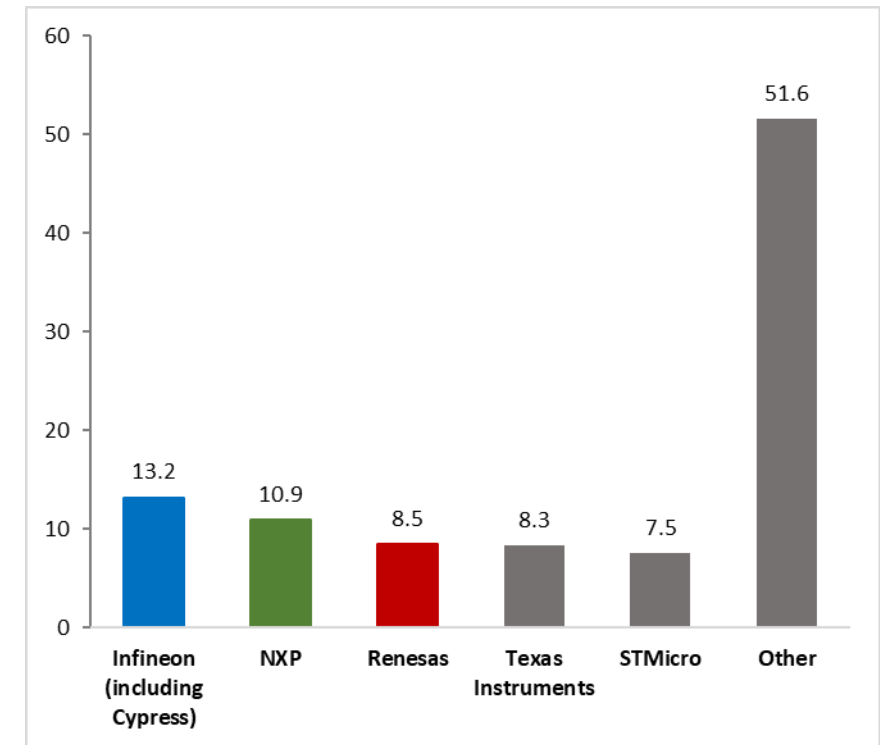
Summary: Semiconductor Shortage / Disruption

- **Earth:** Freak winter storm in Texas in February 2021 knocks off electrical grid impacting Samsung, **Infineon**, and **NXP**
- **Wind:** Increase in demand, reallocation of demand due to pandemic
- **Fire:** **Renesas** plant in Japan in March 2021 (Toyota)
- ... and **Trump** (policy): Trade war tariffs, Export controls on Huawei & SMIC lead to hoarding/uncertainty

Response

- Policy – Industrial policy in US (CHIPS Act, Fabs Act) and Europe
- Investment
- Contractual relationships between automakers and semiconductor companies

Semiconductor manufacturers for automakers
global market share in 2020, percent



Source: Statista

Shocks I: Russia, Ukraine and Sanctions

REALTIME ECONOMIC ISSUES WATCH

Russia's war on Ukraine: A sanctions timeline

Chad P. Bown (PIIE)

Sanctions against Russia and other major events starting November 2021

Hover over dots for summary of events, or see full list below by sanction type and country



Filter by sanction type: Financial Individual Import Export Travel No sanction

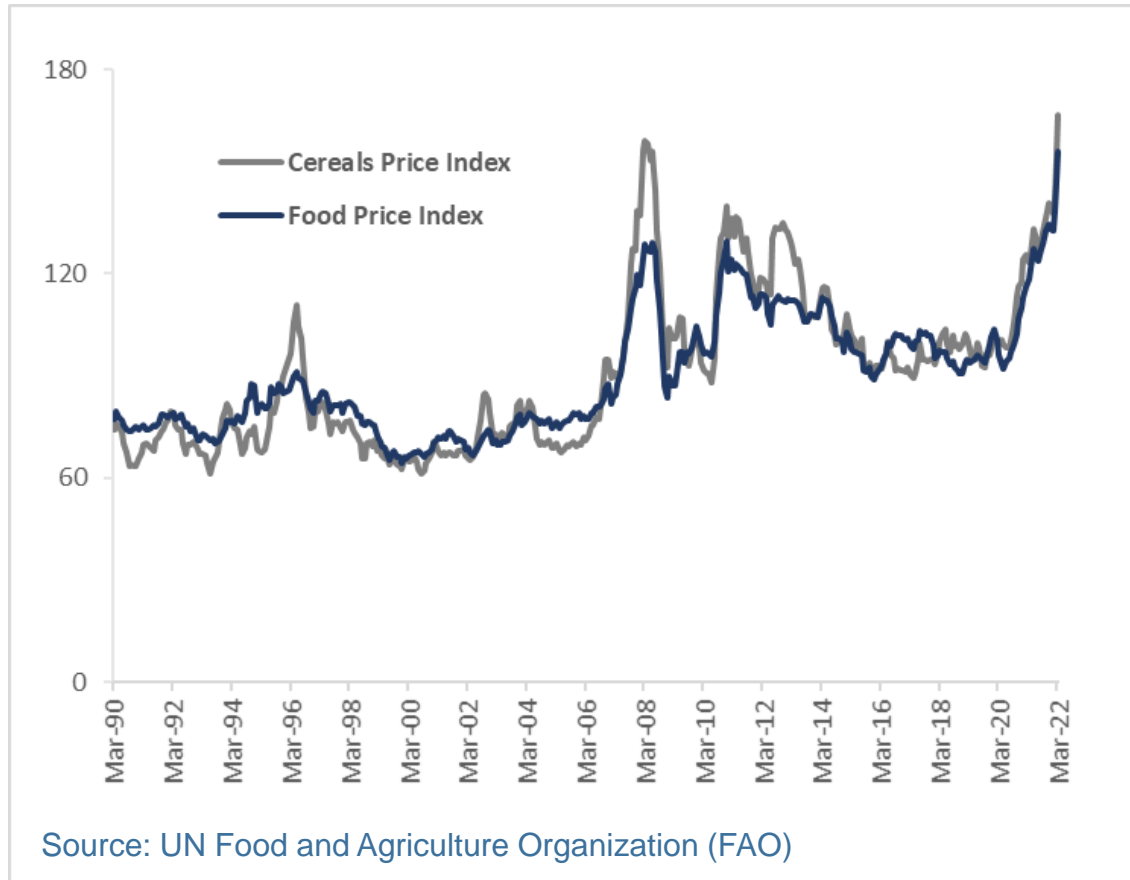
Filter by government imposing sanction: US UK EU Japan Australia Canada Germany France Italy Russia Switzerland China South Korea Norway Iceland New Zealand India Taiwan Ukraine Indonesia Turkey Mexico Brazil Argentina Singapore South Africa

Feb 22, 2022	United States	Financial, Individual	Following the February 21 EO, US Treasury sanctions two major Russian state-owned financial institutions (VEB, PSB) and their subsidiaries that are critical to financing the Russian defense industry, five Kremlin-connected oligarchs, and imposes additional restrictions on Russian sovereign debt.
Feb 22, 2022	United Kingdom	Financial, Individual, Travel	In response to Putin's decrees, the UK freezes assets of five Russian banks, freezes assets and bans travel for three Russian oligarchs, and sanctions Russian politicians who voted to recognize the independence of the Ukrainian regions.
Feb 22, 2022	Germany	Import	Chancellor Olaf Scholz announces Germany has suspended certification of Nord Stream 2, the controversial \$11 billion new gas pipeline set to increase supply from Russia to Germany through the North Sea, bypassing Ukraine. PIIE Read more on EU energy
Feb 23, 2022	European Union	Financial, Individual, Import, Export, Travel	The EU announces new sanctions, including an import ban on goods from the non-government controlled areas of DNR and LNR, restrictions on trade and investments, an export ban for certain goods and technologies, restrained Russian access to the EU's capital and financial markets and services, and more travel bans and asset freezes for a number of Russian individuals.
Feb 23, 2022	Australia	Financial, Individual, Travel	In response to Putin's decrees, Australia imposes financial sanctions and travel bans on 8 Russian officials and restricts Australians from transacting with Russian banks (Rossiya Bank, Promsvyazbank, IS Bank, Genbank, Black Sea Bank for Development and Reconstruction, VEB).
Feb 24, 2022	Japan	Financial, Import, Export, Travel	In response to Putin's decrees, Japan's Ministry of Foreign Affairs announces travel restrictions, trade restrictions, and limitations on transactions with designated Russian banks and Russian sovereign debt.

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Russia, Ukraine and Food Security

World food prices are hitting new heights, threatening food security
(Index, 2014-2016=100)



2021 problems:

- High energy prices, high fertilizer prices
- Export restrictions on fertilizers in Russia, China
- Drought in North America
- Stocks at lowest levels since 2007-8

Now add 2022 problems:

- War in Ukraine and Russia (30 percent of global wheat exports)
- Additional export restrictions

Russia, Sanctions and Transportation



China-Europe Railway Express (Belt and Road Initiative)

- Share of China-EU bilateral goods trade arriving **by rail** more than doubled (from 2% to 5%) between 2016 and 2021
- Freight trains up by a factor of 9 between 2016 (1,702) and 2021 (15,183)
- Could be impacted by the nature of EU sanctions on Russian railways, container ships (etc.)

Sources: [China Railway Express Construction and Development Plan \(2016-2020\)](#), [SCMP](#) and [China One Belt One Road Network Comprehensive](#).

Shocks II: China's recent COVID-19 lockdowns



Source: Lovely and Dahlman (forthcoming)

Guangdong – 23% of exports

- Telecom equipment
- Semiconductors
- Electronics

Shanghai – 7% of exports

- Electronics
- Semiconductors
- Telecom equipment

Jilin – 0.1% of exports

- But 6% of China's food production, including 11% of China's corn production

Conclusion

- Supply chain disruptions persist
- Thanks!



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Chad P. Bown

cbown@piie.com

[@ChadBown](https://twitter.com/ChadBown)

1750 Massachusetts Avenue, NW | Washington, DC 20036 | www.piie.com