Global Supply Chain Disruptions

Global Economic Prospects: Spring 2022

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April 12, 2022
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.

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

Semiconductor sales growth in 2020, percent (2020 total sales, $ billion)

US autos and semiconductors over the long run

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

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

Source: FRED.
US autos and semiconductors during the pandemic

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

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

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)

July 2018:
U.S. imposes 25% tariffs

US imports of semiconductors, by volume...

...in 2017

...in 2021

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.
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

Source: Statista
Shocks I: Russia, Ukraine and Sanctions

Russia’s war on Ukraine: A sanctions timeline

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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

Feb 6 – 26, 2022
IOC bans Russian athletes from Tokyo Olympics over doping.

Feb 21, 2022
Putin orders troops to Ukraine. Countries start sanctions against Russia.

Feb 22, 2022
Russia invades Ukraine.

Feb 26, 2022
Countries remove some Russian banks from SWIFT target Russian Central Bank.

Mar 11, 2022
The EU announce joint actions, including on imports from Russia.

Apr 6, 2023
The EU responds to Russian sanctions in Bucharest.

Feb 22, 2022
United States

United Kingdom

Germany

European Union

Australia

Japan

Following the February 21 EO, US Treasury sanctions two major Russian state-owned financial institutions (Vedr, PSO) and their subsidiaries that are critical to financing the Russian defense industry, the Kremlin-connected oligarchs, and imposes additional restrictions on Russian sovereign debt.

In response to Putin’s decree, 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.

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, imposing Ukraine.

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.

In response to Putin’s decree, Australia imposes financial sanctions and travel bans on 8 Russian officials and restricts Australians from traveling with Russian banks (Rossiya Bank, Promsvyazbank, IS Bank, Derzbank, Black Sea Bank for Development and Reconstruction, VEB).

In response to Putin’s decree, Japan’s Ministry of Foreign Affairs announces travel restrictions, trade restrictions, and limitations on transactions with designated Russian banks and Russian sovereign debt.

Filter by sanction type: Financial, Economic, Export, Travel, Open Sanctions

Filter by government imposing sanctions: United States, United Kingdom, Germany, European Union, Australia, Japan, South Korea, Iceland, New Zealand, India, Taiwan, Ukraine, Indonesia, Turkey, Mexico, Brazil, Argentina, Singapore, South Africa.
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

Source: UN Food and Agriculture Organization (FAO)
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**

**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

Source: Lovely and Dahlman (forthcoming)
Conclusion

• Supply chain disruptions persist
• Thanks!
Global Supply Chain Disruptions

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