The Effects of Supply Chain Disruptions: 
Trade, Output, and Prices

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Based on a research on international supply chains with
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Outline

- State of the Economy
- Effects of Supply Disruptions
  - Firms
  - Aggregate
- International Trade
- Going forward
State of the Economy

- Challenges in getting inputs or consumption goods
- Substantial inflation: March 8.5% (highest in 40 years!)
- Booming, but slowing consumer expenditures on goods
- Global in nature
- Somewhat unusual, but not entirely new, common pre-1980
- Unlikely to resolve soon (built in inertia, & transitory nature)
Restocking and Supply chain disruptions: Timeliness

- Restocking has become incredibly hard

- Confluence of factors
  - Production disruptions
  - Reduce freight capacity (Air, transportation, border closures)
  - Unexpected pace of recovery
  - Disease outbreaks at ports, production hubs
  - Congestion effects
  - Inherent transitory, unique nature of shock

- Disruptions happening both internationally and domestically

- Lead time on inputs: 60 days $\rightarrow$ 100 days

- Disruption “shock” $\neq$ COVID “shock” (although, they interact)
Delivery delays (Institute for Supply Management)

Last observation: March 2022
Domestic and foreign supplier delays (Census, Pulse survey)

In the last week, did this business have any of the following?

- Foreign supplier delays
- Domestic supplier delays
- Delays in delivery/shipping to customers

Last observation: March 28, 2022
Shipping Time and Cost (Freightos)

**SEA SLUGS**

Trans-pacific shipping costs, which reached an eye-popping $20,500 for a 40-foot container in September, are finally in decline. Wait times, however, continue to grow.

![Graph showing shipping cost (USD) and delivery time (Days) over time from Jan 2020 to Jan 2022.](source: Freightos)
Delays happening when inventory levels are low

Last observation: January 2022
And U.S. Consumer Spending on Goods Booming

Source: BEA, Last date: February 2022
Effects of Supply Disruptions: Firm-level

- A growing literature identifies how firm-level supply disruptions propagate through production networks
  - From suppliers to: customers; to customers-customers; or customers’-suppliers.
- Identification from exogenous shocks: Natural disasters, supplier failures.
- Generally find firms have trouble adjusting to these disruptions in the short-run (1-2 years), more so if the inputs are pretty specific or essential.
  - Eg. Specialized chip for autos
- Disruptions can be partly mitigated in very short-run (6 months) with:
  - Inventories,
  - Diversified supplier bases,
  - Faster transport
Effects of Supply Disruptions: Aggregate (Data)

- Isolating aggregate effects is harder
  - Firm-level shocks lead to substitution across firms (Tokhu Earthquake)

- Requires
  - Unique shocks (Suez Canal disruption in 1967)
  - Strong identification assumptions of relations between aggregate data
Delivery Times and CPI Inflation

Source: Days (ISM), Inflation (BLS)
Delays tend to Precede Recessions

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- Find that increasing delivery times by 5 days will lead to:
  - Further delays that dissipate in about 1.5 years.
  - Lower industrial production by 1-2 percent gradually.
  - Raise prices of goods, particularly exports & imports by 1-2 percent.
  - Current "shock" is 5x bigger and there have been additional shocks so if history is a guide, this will be ongoing for another year.
Effects of Supply Disruptions: Aggregate (Models)

- Early in the model-building as most academic or policy research abstracts from key frictions (delays, inventory management, trade, & risk).

- Focus on key differences between domestic and global supply chains in terms of inventory management (size, frequency of shipments) & mode substitution (air/boat).

- Models allow us to examine policies as well as changing fundamentals
  - Trade policy, infrastructure,
  - Risk/shocks: foreign/domestic, firm-level or aggregate

- Find "delay shocks" twice as contractionary & inflationary in the SR than in our empirical findings.
  - Worse with lean inventories or tight shipping capacity.
  - Transitory, LR effects depend on Monetary & Fiscal Policy.
Trade: Concerns

- Global supply chains and lack of shipping capacity are key issues.
- Push for re-shoring (bringing production closer to the US).
- Calls for greater infrastructure investment.
- Change in transportation regulations (Jones Act).
- Anti-trust concerns with shipping companies (record profits).
Trade: Efficiency and Stabilization

▶ Push back against Global supply chains probably misguided.
▶ Large efficiency gains to producing in most efficient locations.
    ▶ Firms internalize the risks of disruptions.
▶ Stabilization benefits.
    ▶ Diversification benefits - use trade balance to maintain consumption in face of adverse domestic shocks
    ▶ Faster transport modes in crises "boosts" short-run production
    ▶ Higher inventories in Global supply chains creates an aggregate buffer.
▶ Tradeoff benefits against costs in extreme events.
▶ Key challenge: likelihood of future extreme events/policy disruptions.
Going Forward

► When will it end? How will it end?

► Rising prices will lead to delays in spending.

► Further re-opening should
  ► Shift spending to services and away from goods.
  ► Lifting travel restrictions will increase Air-capacity (albeit less to China)
  ► Restocking cycle will conclude.

► Suspect the transitory forces should start to dissipate, but it will take time
  ► Risk of further shocks.

► Key concern is for policy not to over-react to this shock.
Resources

- Non-technical research papers
- Virtual International Trade & Macro Seminar
- Research by Rochester Economics Faculty and Students
US Net Exports, More Borrowing From Rest of the World

Net Export Share of Sales

-7.5 -7 -6.5 -6 -5.5 -5

2019m1 2020m1 2021m1 2022m1

Last date: January, 2022, Source: Census
US Economy Recovery Lagged Rest of the World

Last date: February, 2022, Source: Census, Dallas Fed
US Trade recovered

Last date: January, 2022, Source: Census
Mode substitution: PPE during the early covid pandemic
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