The Effect of Korea-Japan Relations on Trade and The Global Economic Order

KEI-KITA Joint Seminar

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About ITIF

▪ The world’s leading science and technology policy think tank.
▪ Supports policies driving global, innovation-based economic growth.
▪ Focuses on a host of issues at the intersection of technology innovation and public policy across several sectors:
  – Innovation and competitiveness
  – IT and data
  – Telecommunications
  – Trade and globalization
  – Clean energy, manufacturing, life sciences, and ag biotech
Semiconductors Are A Uniquely Integrated Global Industry

Beyond Borders: Semiconductors are a Uniquely Global Industry
Typical semiconductor production process spans multiple countries: 4+ Countries, 4+ States, 3+ trips around the world, 25,000 miles travelled, 100 days TPT, 12 days in transit

Stylized Semiconductor Production Process

Design
- IP intensive
- No manufacturing
- High value
- Concentrated among few firms

Front-end Manufacturing
- Requires imported specialized chemicals and machinery
- Highly capital and IP intensive
- High value
- Concentrated among few firms

Assembly, testing, and packaging
- Specialized chemicals and machinery
- Capital, and labor intensive
- Relatively low value

Source: Samuel M. Goodman, Dan Kim, and John VerWey, U.S. ITC, “The South Korea-Japan Trade Dispute in Context: Semiconductor Manufacturing, Chemicals, and Concentrated Supply Chains”
What’s At Stake For Korea?

- Korea’s semiconductor industry has second-most overall fabrication capacity.
- Samsung and SK Hynix are world’s 2\textsuperscript{nd} and 4\textsuperscript{th} largest semiconductor suppliers.

Share of Semiconductor Integrated Design Manufacturers

- United States: 51%
- South Korea: 28%
- Japan: 11%
- Europe: 7%
- Taiwan: 2%
- Others: 1%

Total Global Wafer Capacity, December 2018

- Taiwan: 22%
- South Korea: 17%
- Japan: 13%
- North America: 12%
- China: 8%
- Others: 9%

Source: Samuel M. Goodman, Dan Kim, and John VerWey, U.S. ITC, “The South Korea-Japan Trade Dispute in Context: Semiconductor Manufacturing, Chemicals, and Concentrated Supply Chains”
What’s At Stake For Korea?

▪ Semiconductors and related components account for 30% of Korean exports.

▪ In 2018, semiconductors accounted for 92% of Korean export growth.

▪ Semiconductors accounted for 80% of Korea’s current account surplus in 2017-2018.

▪ Downside GDP risk of ongoing stalemate = 2 to 2.6% of Korean GDP.

Source: Financial Times, “Korea Caught In the Crossfire of Trade and Tech Wars,” July 13, 2019; Bloomberg, “Economists Warn of Larger Ripple Effect of Japan-South Korea Trade War”
What’s The Issue?

- Japan has imposed export controls on three chemical inputs critical to semiconductor production.
- Japan produces 90% of world’s supply of fluorinated polyimide and photoresists.
- Japan accounts for 70% of global production of hydrogen fluoride.

Source: Samuel M. Goodman, Dan Kim, and John VerWey, U.S. ITC, "The South Korea-Japan Trade Dispute in Context: Semiconductor Manufacturing, Chemicals, and Concentrated Supply Chains"
Photoresists

- Establish the pattern upon which semiconductor micro-circuitry is built.
- 90% of Korean photoresist imports in 2018 originated from Japan.
- Few alternative international suppliers, available stockpiles would last only 3-6 months.

Source: Samuel M. Goodman, Dan Kim, and John VerWey, U.S. ITC, "The South Korea-Japan Trade Dispute in Context: Semiconductor Manufacturing, Chemicals, and Concentrated Supply Chains"
Korean Dependence on Japanese Supply

- On average, Korea imports $33.6 million of restricted chemicals monthly.
- But Korea exports $8.4 billion of semiconductors and parts depending on those chemicals.
- Meaning Korean export loss exposure is 250 times greater than that of Japan’s chemical-makers.

<table>
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<th>Export Code</th>
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Source: Samuel M. Goodman, Dan Kim, and John VerWey, U.S. ITC, "The South Korea-Japan Trade Dispute in Context: Semiconductor Manufacturing, Chemicals, and Concentrated Supply Chains"
Downstream Supply Chain Impacts

- Export restrictions not only impact Korea’s electronics manufacturers, but all downstream industries that depend on integrated circuits, in Korea & abroad.

International Impacts

▪ Short-term: TSMC (Taiwan) and Intel (U.S.) likely beneficiaries of dispute.

▪ Long-term: “These actions create incentives for Korean chipmakers to significantly lessen their sourcing from Japanese suppliers, not only in specialized chemicals, but throughout the entire semiconductor supply chain.” – Goodman, Kim, VerWey

▪ China unlikely to capitalize in short-term, but adds impetus to China’s ambition for autarkic production of semiconductor sector.

▪ Amicable resolution needed to maintain confidence in globalization of both semiconductor supply chains and liberalized market-based trade.

Thank You!

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