Global Supply Chain and Importance of Trade

Example of Semiconductor Product Global Manufacturing Process

Silicon to End-Product Purchase: 4+ Countries, **4+** States, **3+** trips around the world, **25,000** miles traveled, **100** days TPT, **12** days in transit

Importance of Gobal Trade

- 83% of sales outside the U.S.
- 4th largest U.S. export

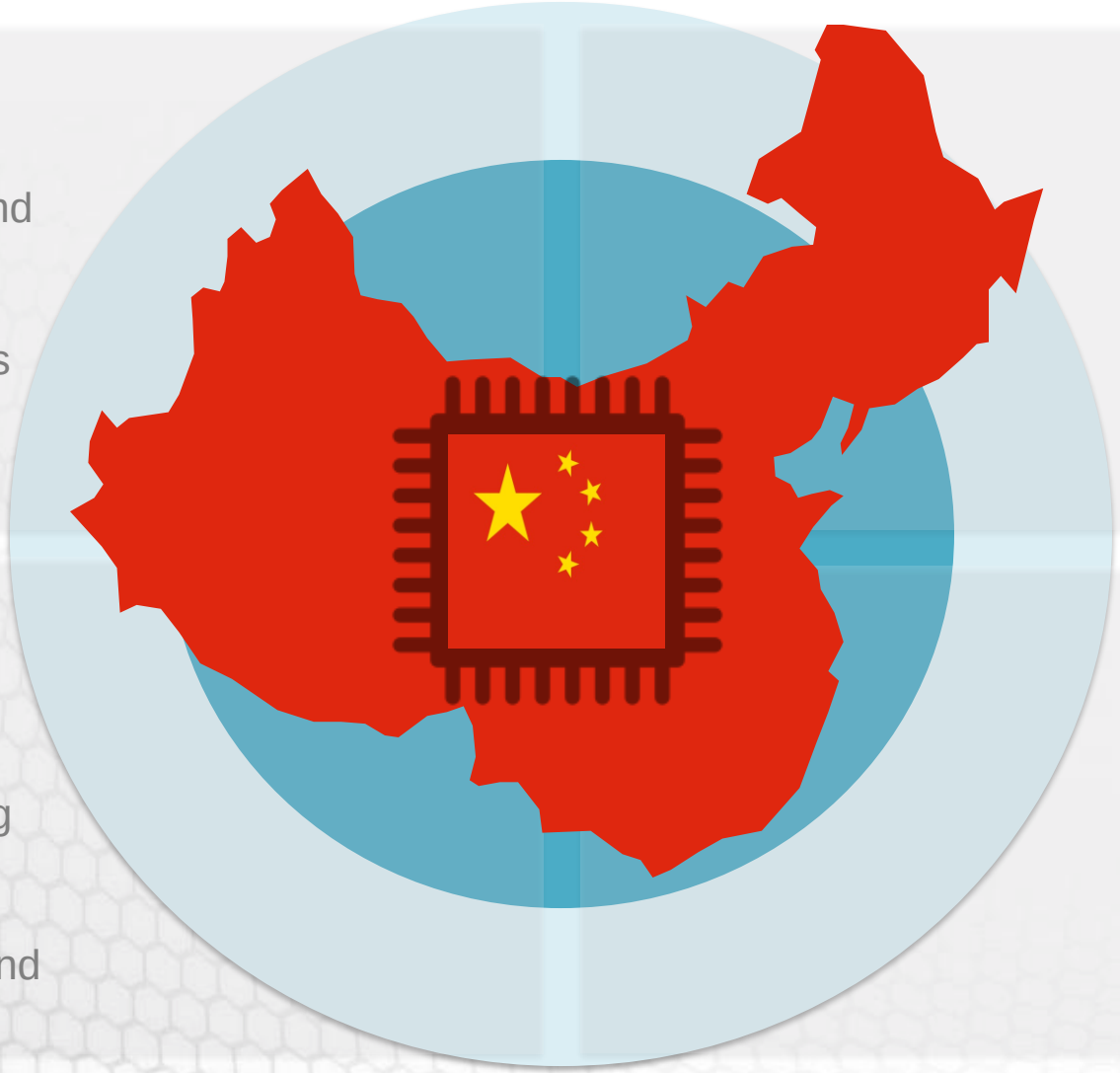
China's Semiconductor Challenge

investments

- Large scale investment fund ($150B)
  - Acquisitions
  - Domestic preferences
  - Research
- Seeking leadership in all industry segments

strategic recruiting

- Major increase in recruiting top talent in order to run domestic fabs
- Focus on manufacturing and process technology



IP theft

- Difficult to track but continues to be issue
- New accusations of IP theft in U.S., Taiwan, S. Korea
- Process technology is key focus

ecosystem knowledge

- China seeking to leverage supply chain providers for additional sources of know how and technology

CFIUS Reform & Export Control

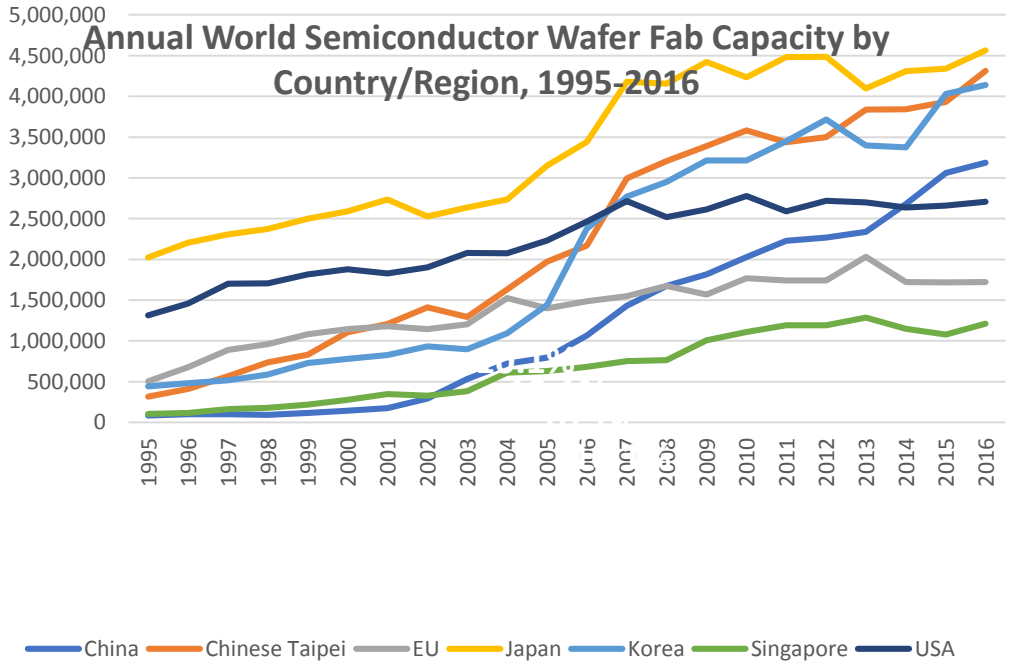
CFIUS Reform

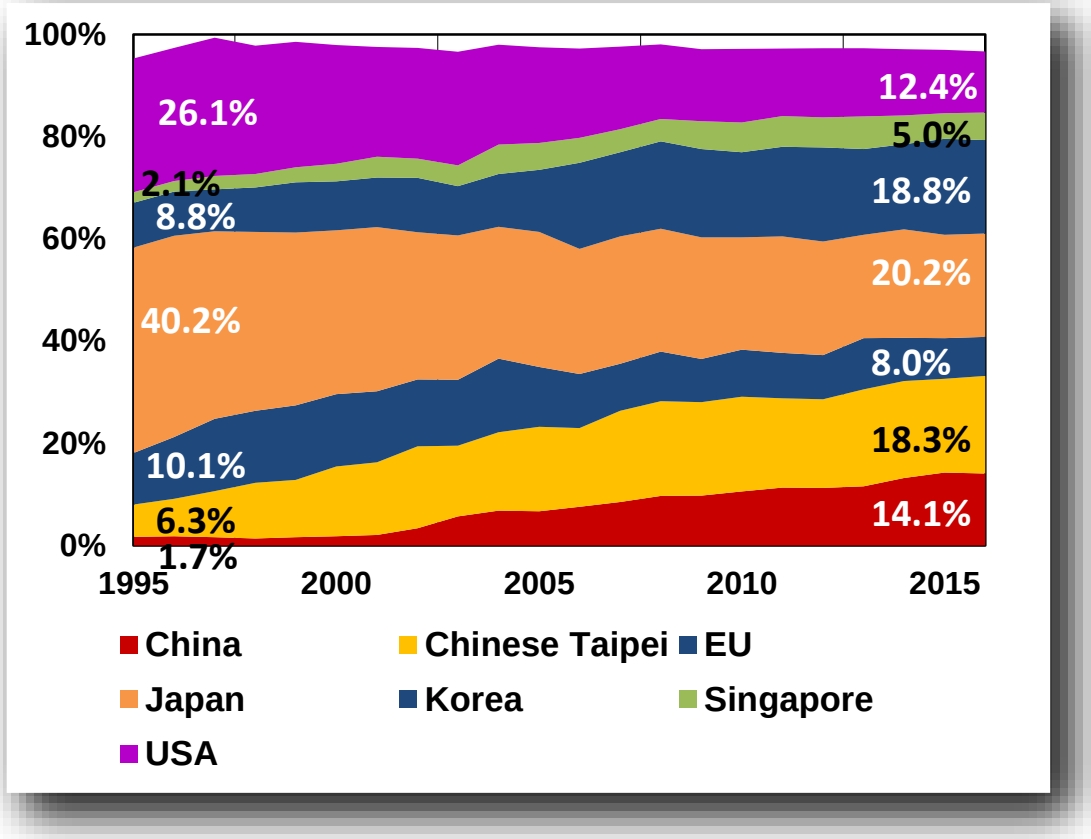
- Proposals to reform and expand CFIUS to address concerns over the transfer of critical technology to China and others
- Challenge of striking the right balance between national security and conducting business globally

Export Control

- The Trump Administration is reviewing what changes, if any, are needed to ensure export control regulations account for Chinese semiconductor industry capabilities, along with traditional concerns of end use diversion
- Existing unilateral U.S. controls over emerging technologies with potential for significant growth (e.g., 5G) may disadvantage U.S. companies at the expense of foreign competitors

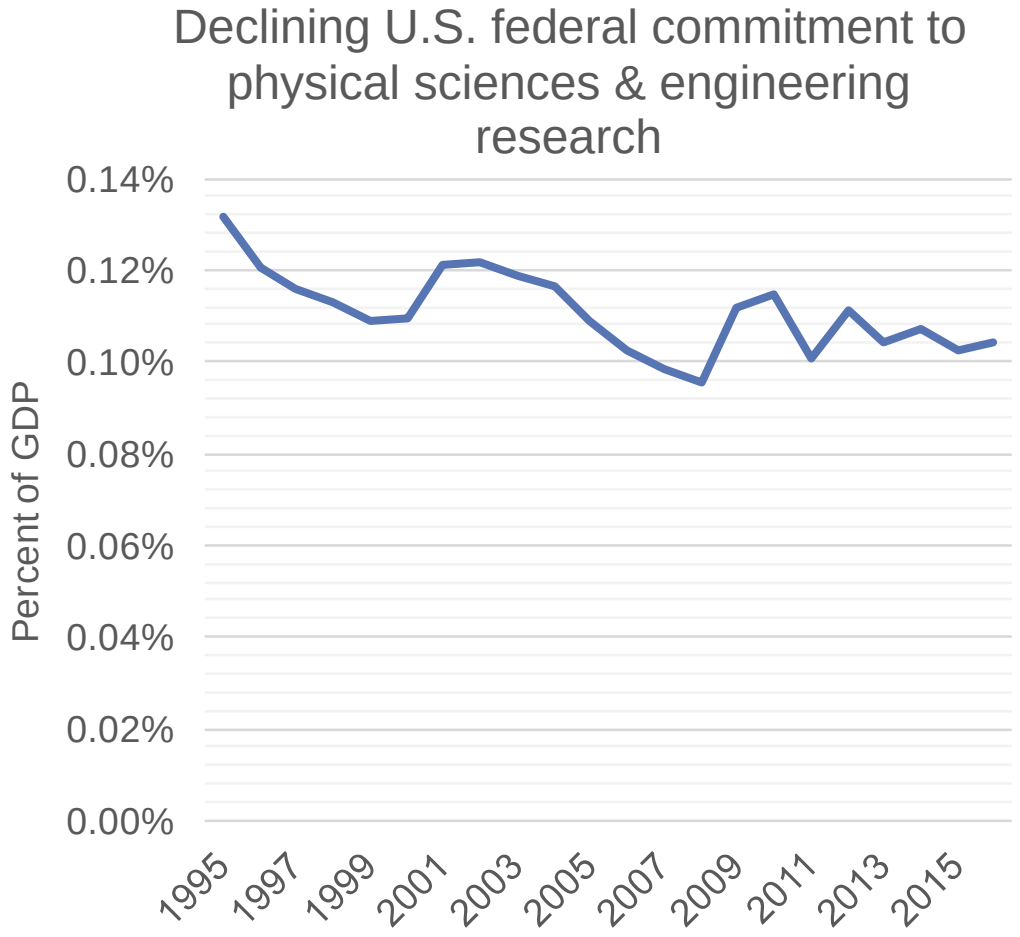
Worldwide Fab Capacity – U.S. Capacity Increases, But Not Keeping Pace



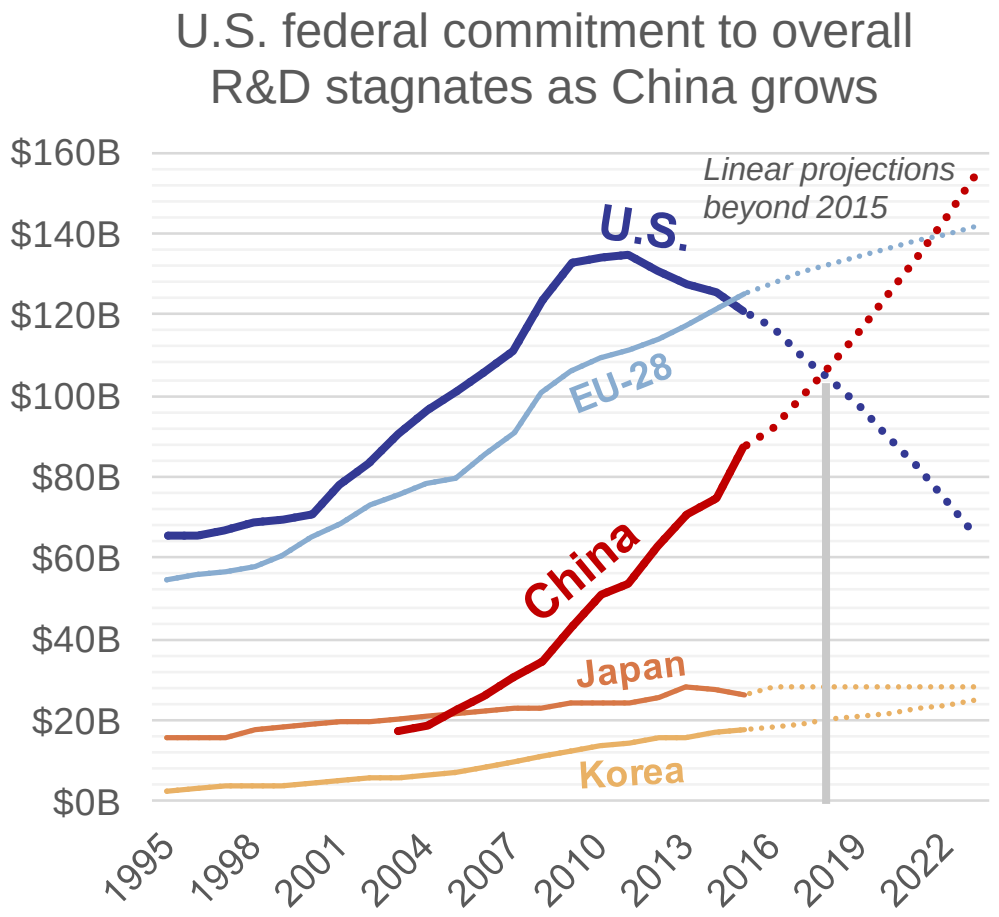


Source: SEMI World Fab Watch, 2016
Note: Wafer capacity is measured as number of wafer starts per month of 8 inch equivalent silicon wafers

U.S. stagnates, others double down on innovation



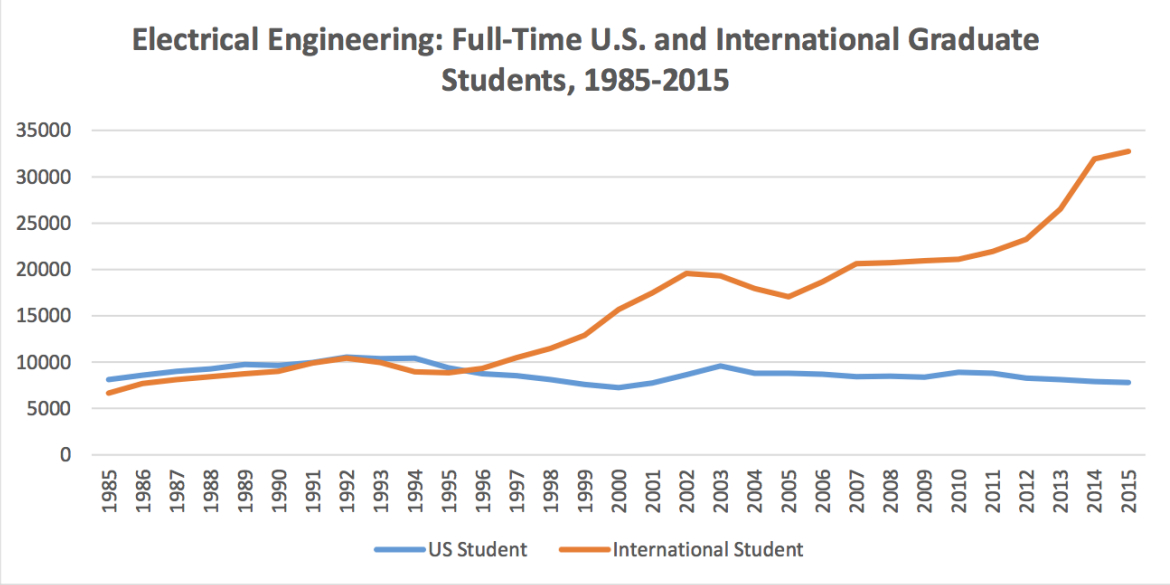
SOURCES: National Science Foundation, Federal Funds for R&D survey and OMB, via AAAS R&D Budget & Policy Program (2017)



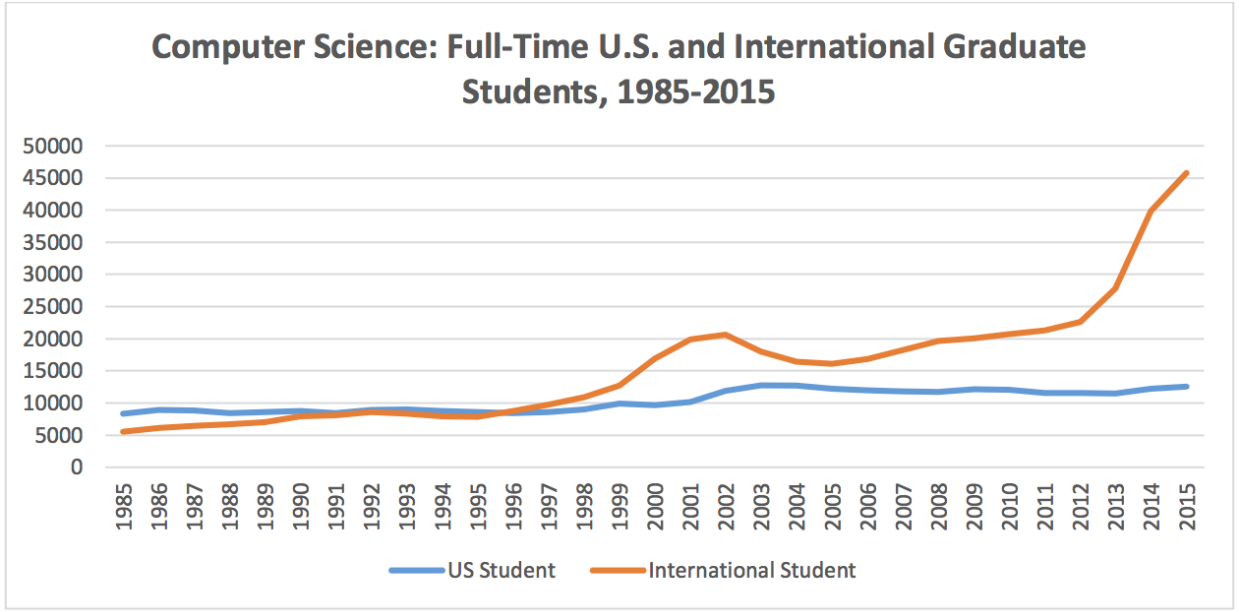
SOURCES: OECD Main Science & Technology Indicators (2017), and IMF World Economic Outlook (2017)

SEMICONDUCTOR INDUSTRY ASSOCIATION

International students make up growing fraction of EE & CS graduate students at U.S. institutions



Source: National Science Foundation, Survey of Graduate Students and Postdoctorates, NFAP calculations. U.S. students include lawful permanent residents.



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