



# U.S. Department of Commerce Bureau of Industry and Security OFFICE OF TECHNOLOGY EVALUATION

## CHINA, PCAST, AND THE BIS 2017 ASSESSMENT OF THE U.S. IC DESIGN & MANUFACTURING INDUSTRY

NDIA Trusted Microelectronics Workshop  
August 16, 2017

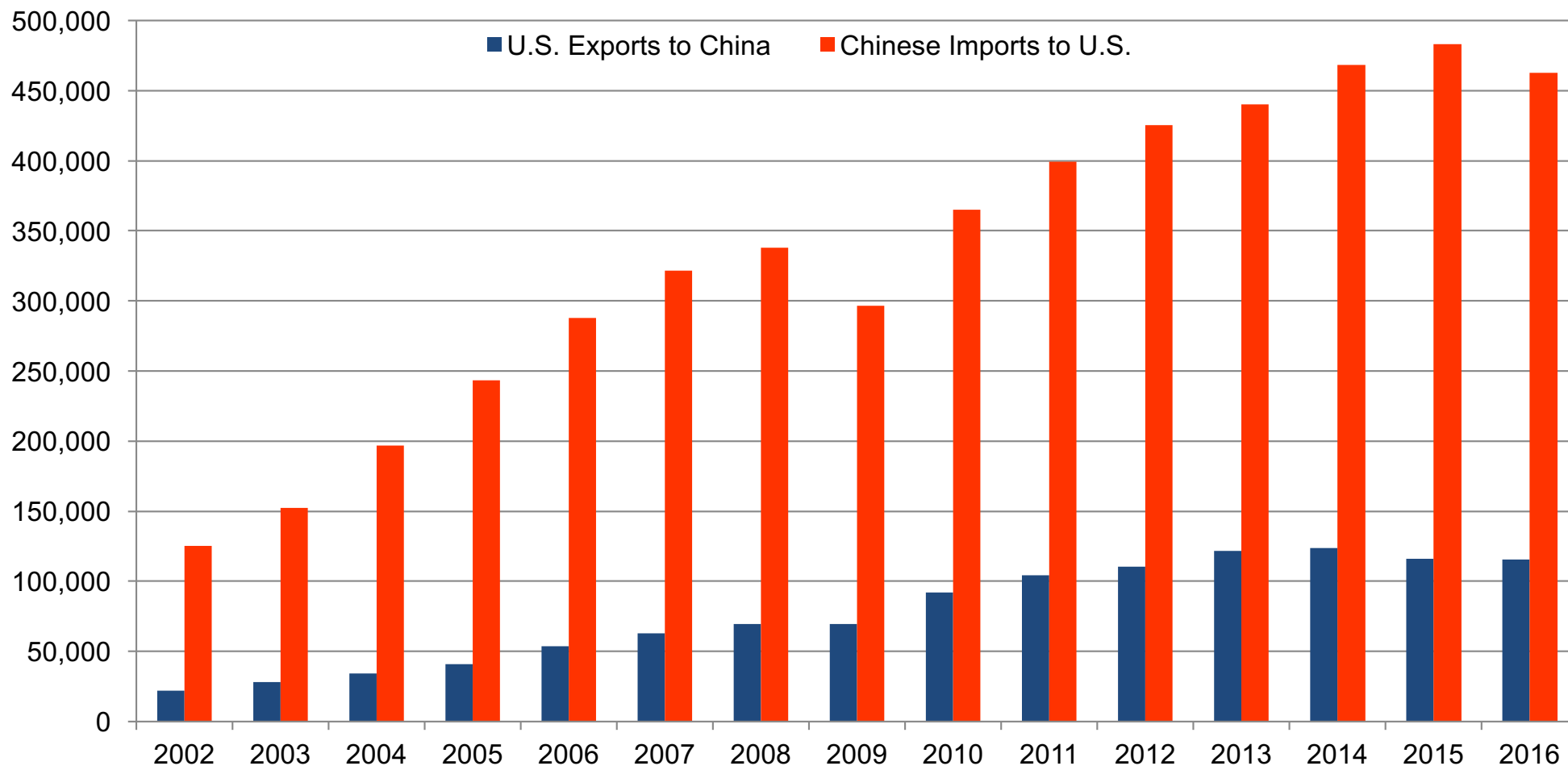
Brad Botwin, Director - Industrial Studies

*Source: U.S. Department of Commerce, Bureau of Industry and Security  
U.S. Integrated Circuit Assessment – 2017 – UNCLASSIFIED - Preliminary*



# Macroeconomic Trends

## U.S. Trade in Goods with China 2002 – 2016 (in millions of dollars)

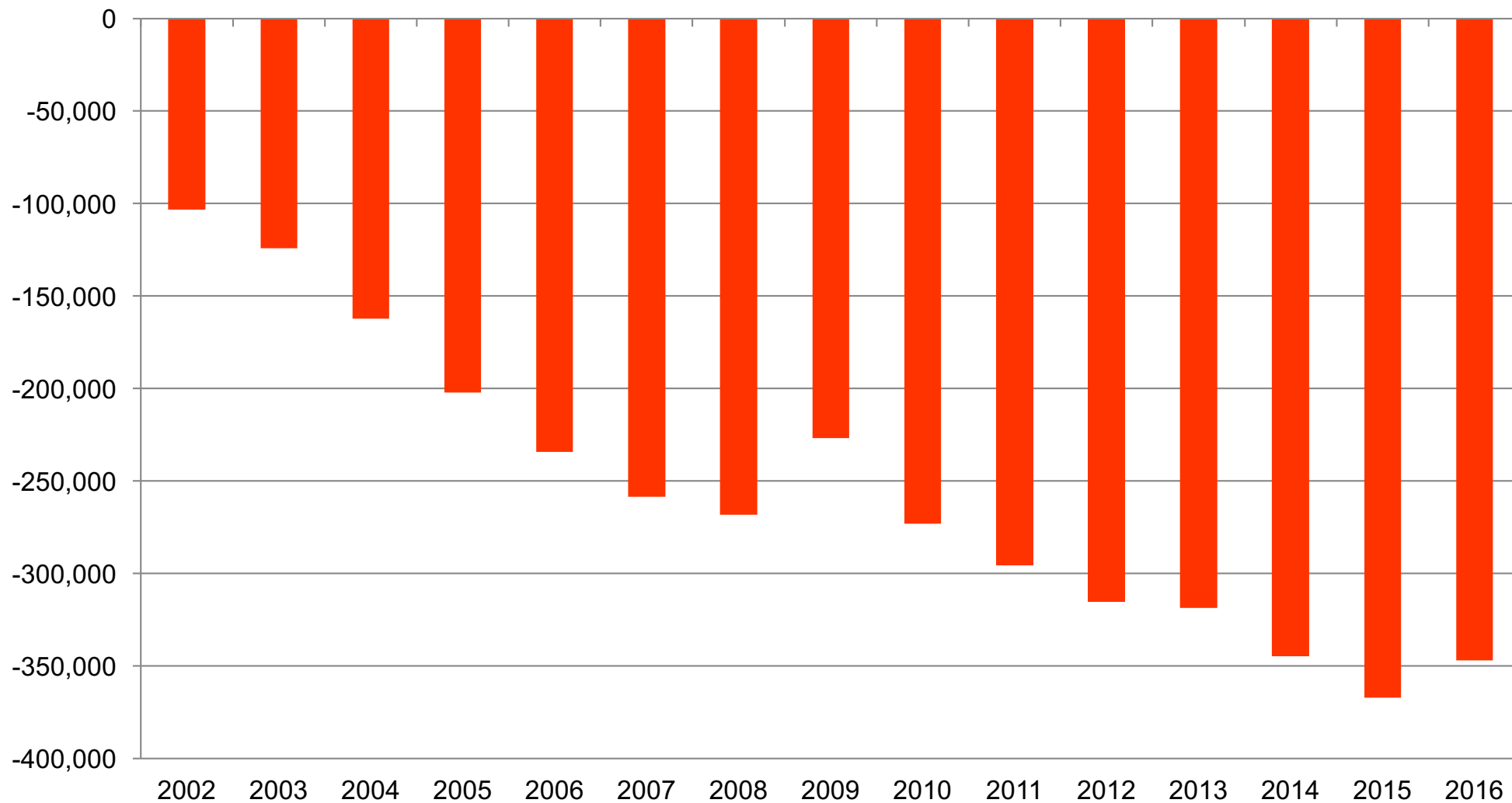


All Data from U.S. Census Bureau



# Macroeconomic Trends

## Balance of Trade (Exports – Imports) in Goods Between U.S. and China 2002 - 2016 (in millions of dollars)

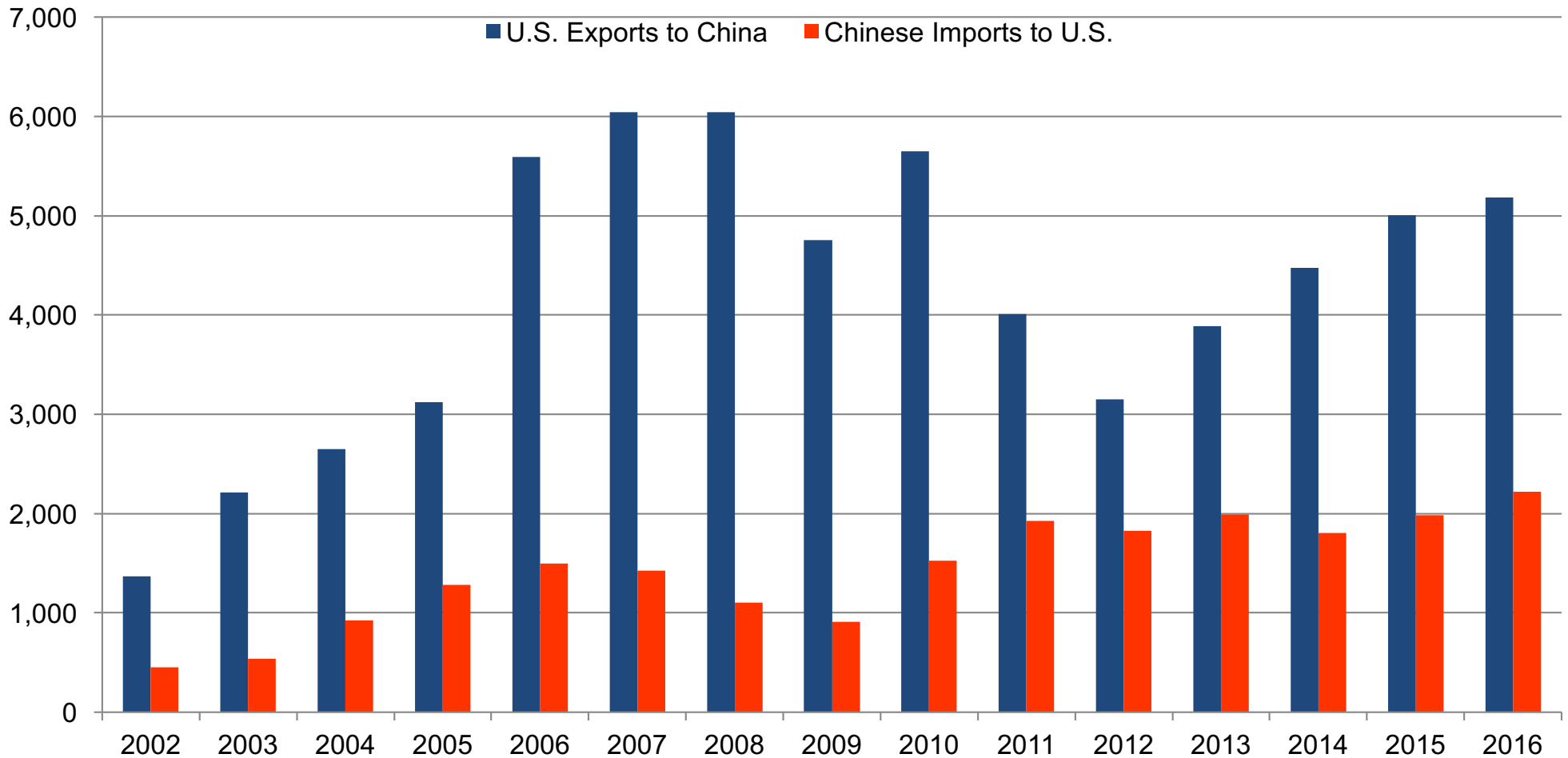


All Data from U.S. Census Bureau



# Macroeconomic Trends

## Trade Between U.S. and China for Integrated Circuits and Microassemblies 2002 - 2016 (in millions of dollars)

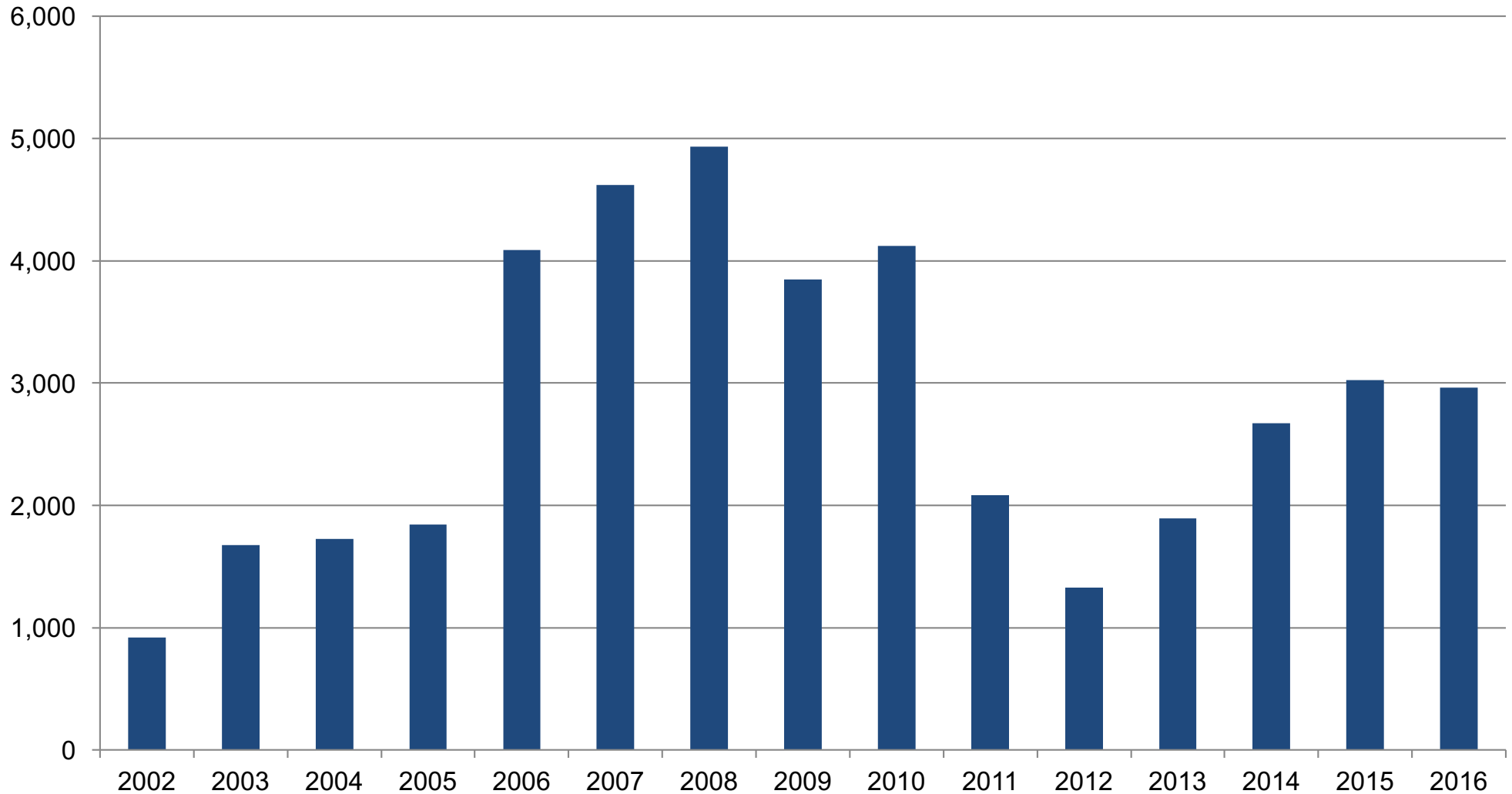


All Data from U.S. International Trade Commission (HTS 8542)



# Macroeconomic Trends

## Balance of Trade (Exports – Imports) Between U.S. and China for Integrated Circuits and Microassemblies 2002 – 2016 (in millions of dollars)



All Data from U.S. International Trade Commission (HTS 8542)



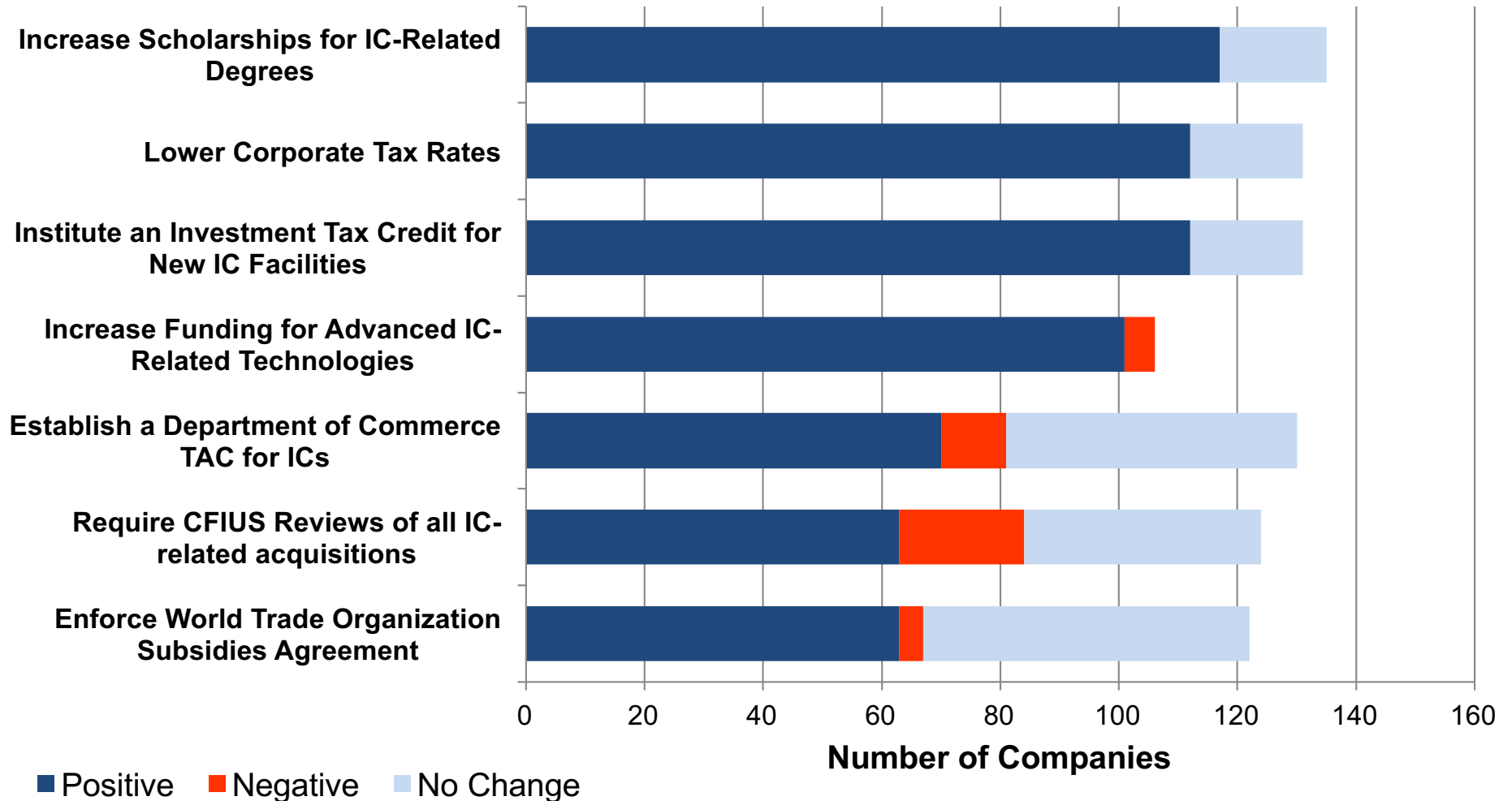
## U.S. IC Design and Manufacturing Assessment Topics Covered by BIS Survey

- Facility Integrated Circuit Design and Manufacturing by Technology Node and Semiconductor Material Type
- Manufacturing Capabilities and Production Rates
- Employment
- Mask Production and Capability
- Performance of Production Steps - Wafer Processing and Die Packaging
- Controllers and Firmware, Bit Cell and Memory Compiler, and IP
- Performance of Production Functions
- National Security Requirements
- Suppliers
- Sales
- Financials
- Acquisitions, Divestitures, Mergers, and Joint Ventures
- Capital Expenditures
- Research and Development
- Export Regulation and Trade Issues
- Trade and Intellectual Property Issues
- Competitiveness and China
- Cybersecurity



# U.S. IC Design and Manufacturing Assessment

## PCAST Recommendations – “Impact of Potential U.S. Government Policy Actions on Industry”



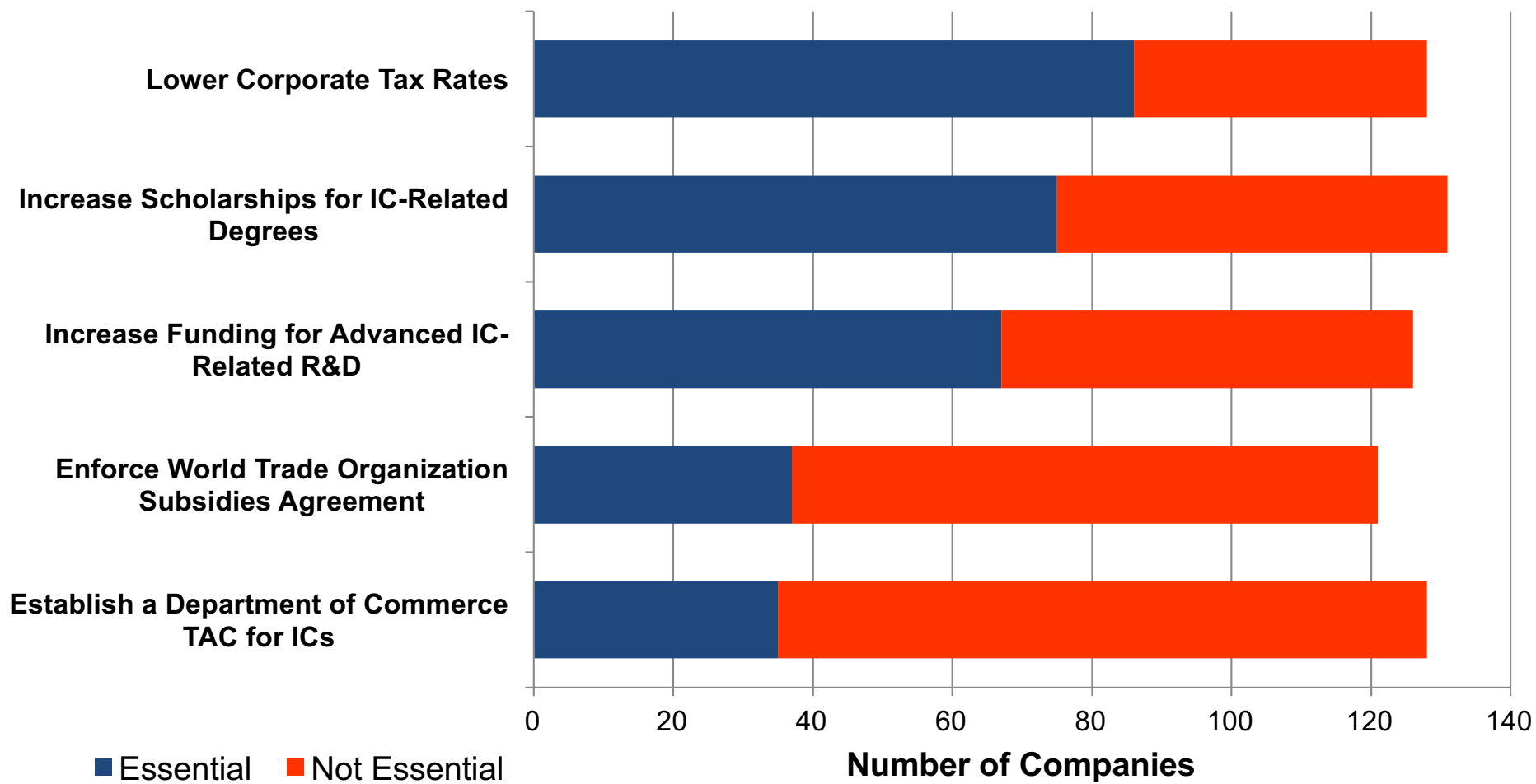
Source: U.S. Department of Commerce, Bureau of Industry and Security  
U.S. Integrated Circuit Assessment – 2017 – UNCLASSIFIED - Preliminary

Respondents: 133 Companies



# U.S. IC Design and Manufacturing Assessment

## PCAST Recommendations – “Importance of Potential U.S. Government Policy Actions”



Source: U.S. Department of Commerce, Bureau of Industry and Security  
U.S. Integrated Circuit Assessment – 2017 – UNCLASSIFIED - Preliminary

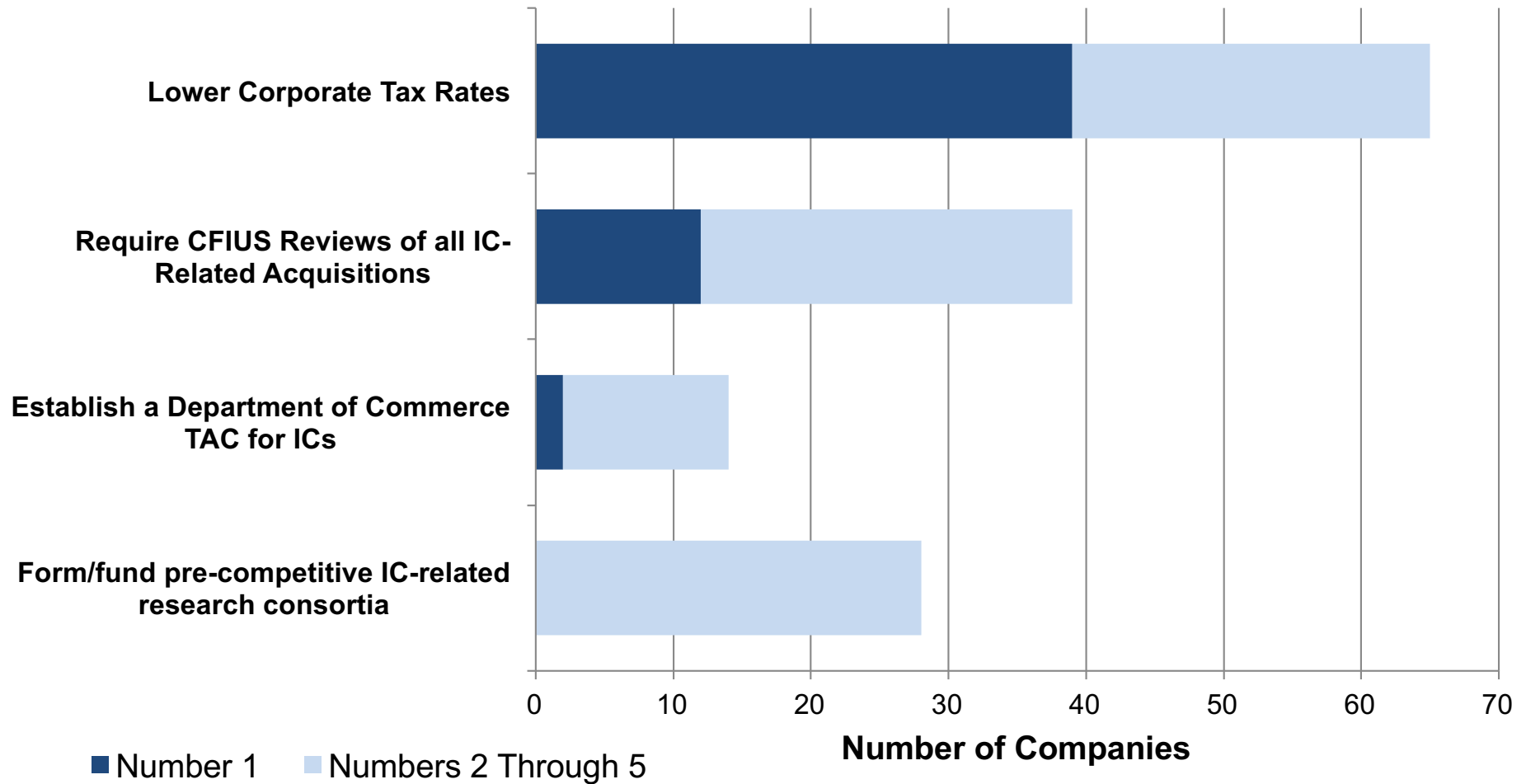
Respondents: 133 Companies





# U.S. IC Design and Manufacturing Assessment

**PCAST Recommendations – “Ranking of Potential U.S. Government Policy Actions”  
(1 being most important)**

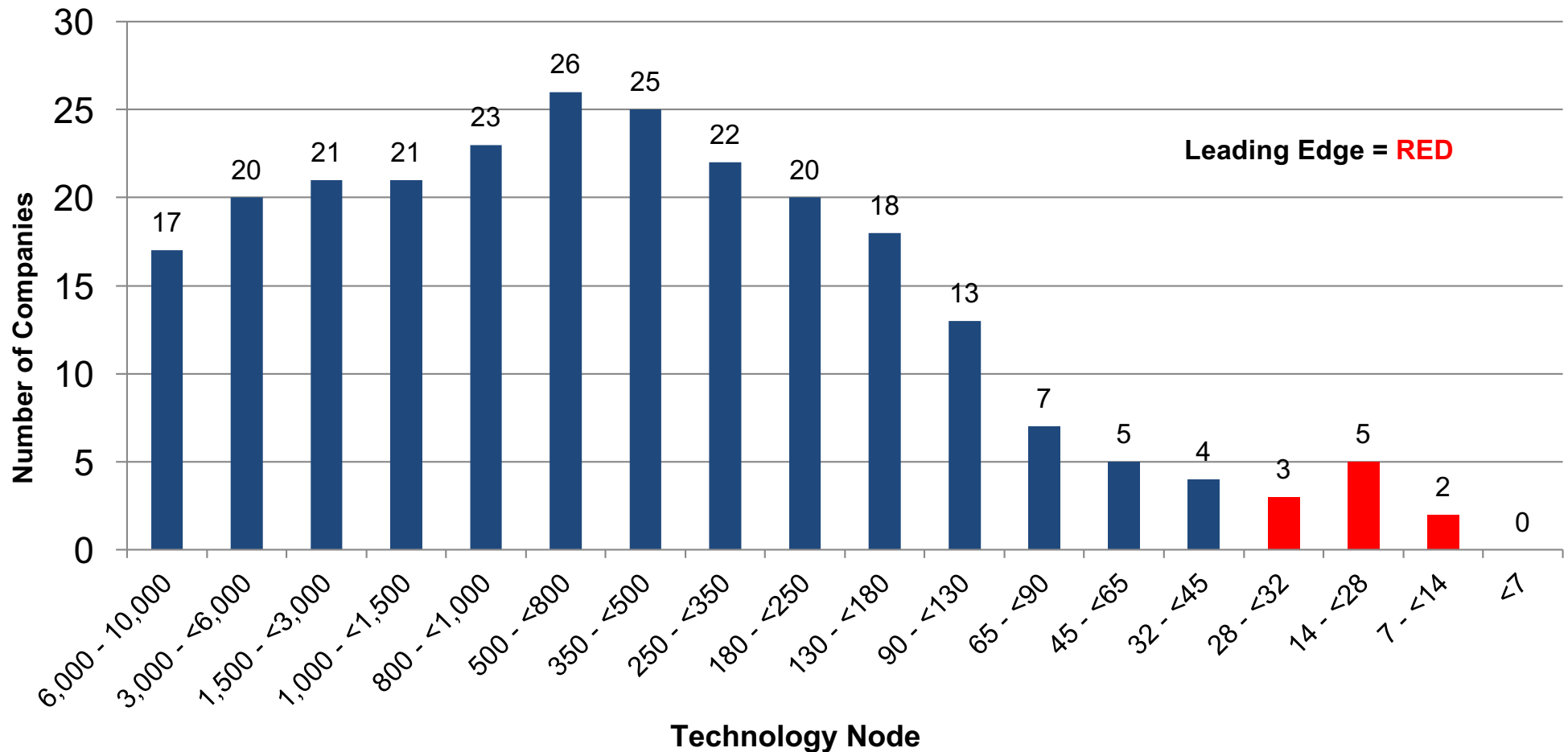


Source: U.S. Department of Commerce, Bureau of Industry and Security  
U.S. Integrated Circuit Assessment – 2017 – UNCLASSIFIED - Preliminary

Respondents: 133 Companies



# U.S. IC Design and Manufacturing Assessment Capabilities of Fabrication Companies by Technology Node

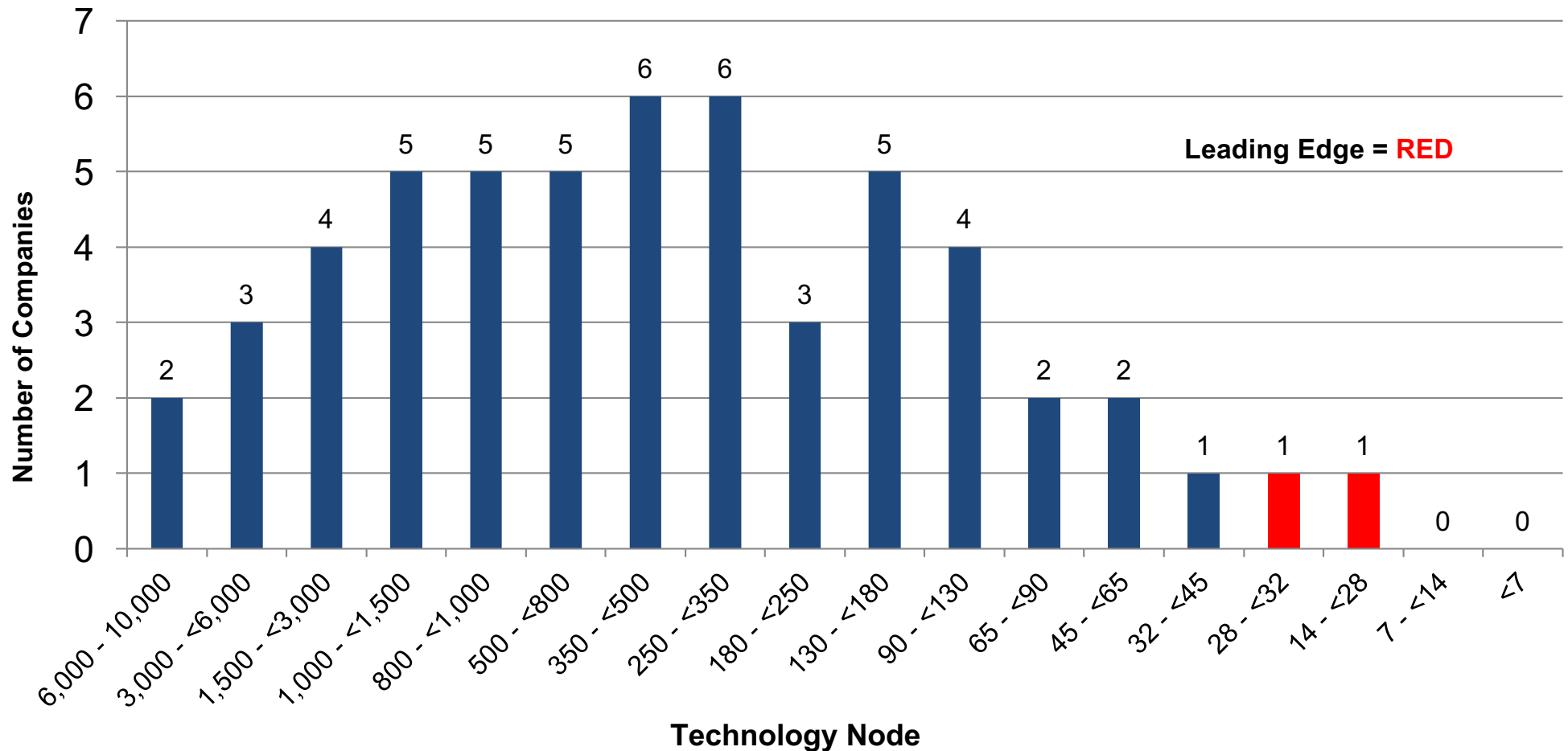


Source: U.S. Department of Commerce, Bureau of Industry and Security  
U.S. Integrated Circuit Assessment – 2017 – UNCLASSIFIED - Preliminary

Respondents: 133 Companies



# U.S. IC Design and Manufacturing Assessment Capabilities of Trusted Fabrication Companies by Technology Node



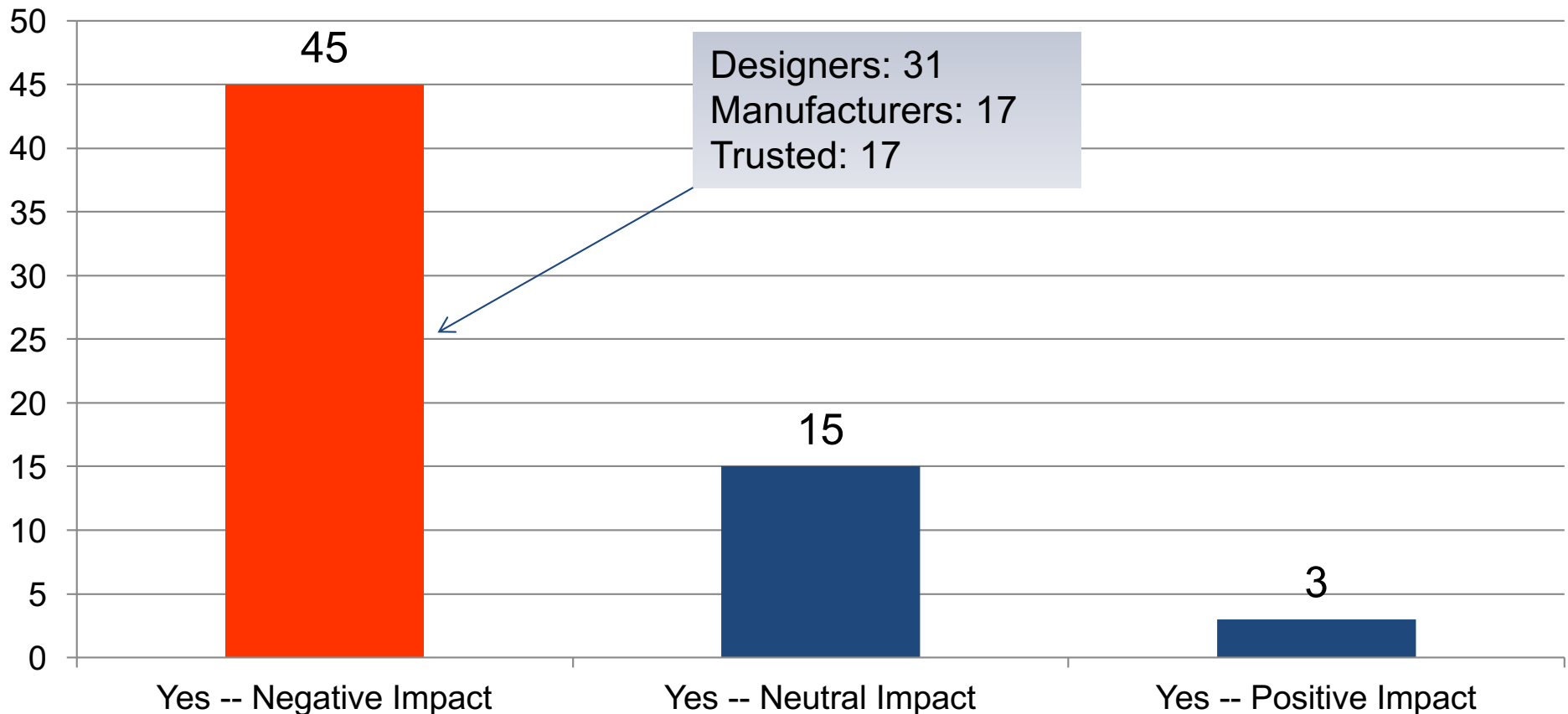
Source: U.S. Department of Commerce, Bureau of Industry and Security  
U.S. Integrated Circuit Assessment – 2017 – UNCLASSIFIED - Preliminary

Respondents: 133 Companies



# U.S. IC Design and Manufacturing Assessment

**Will the closure of specific Integrated Circuit product lines manufactured in the U.S. due to subsidized Chinese IC competition impact your organization?**

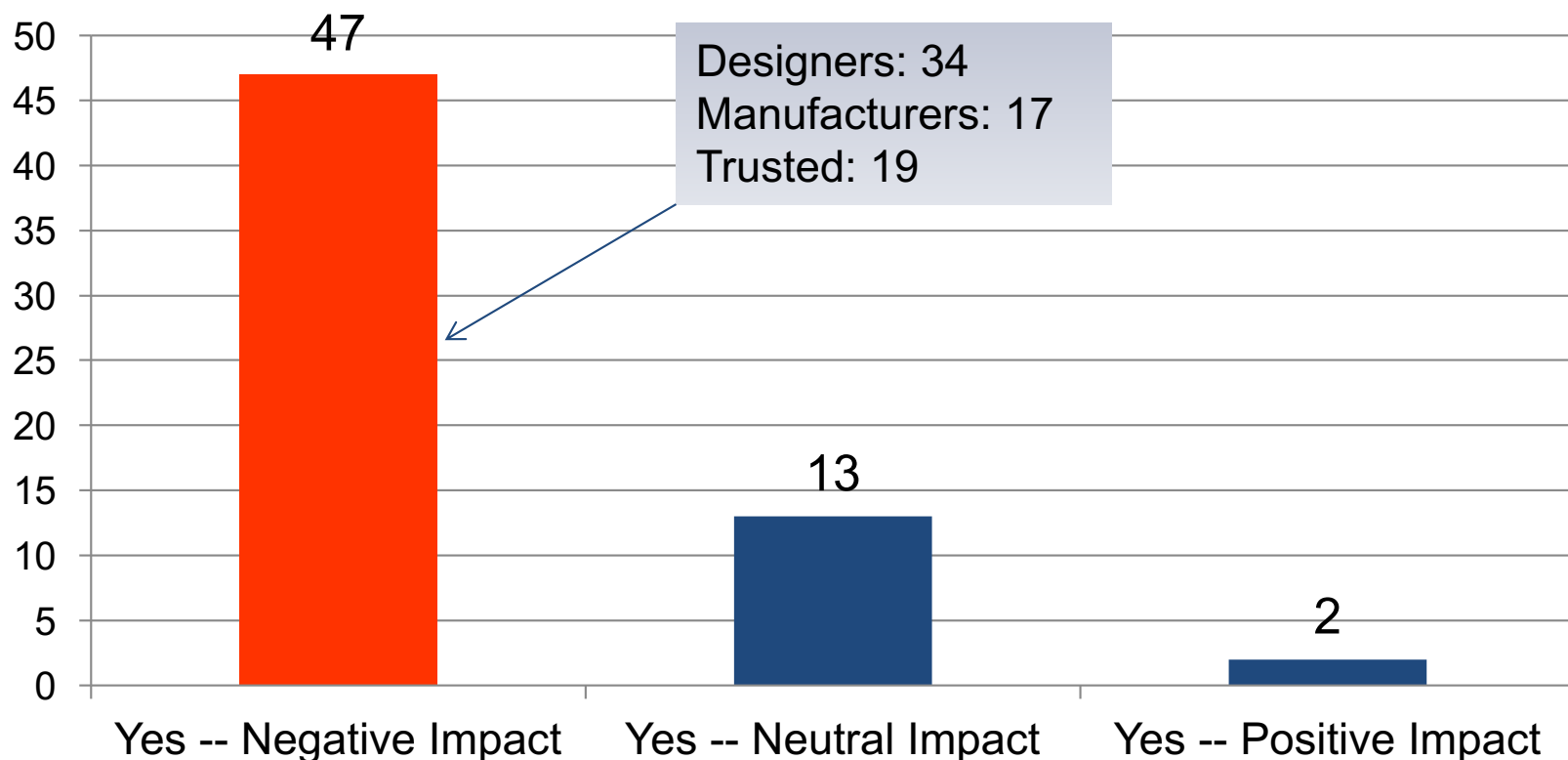


Source: U.S. Department of Commerce, Bureau of Industry and Security  
U.S. Integrated Circuit Assessment – 2017 – UNCLASSIFIED - Preliminary



# U.S. IC Design and Manufacturing Assessment

**Will the closure of one or more Integrated Circuit manufacturing facilities in the U.S. due to subsidized Chinese IC competition impact your organization?**

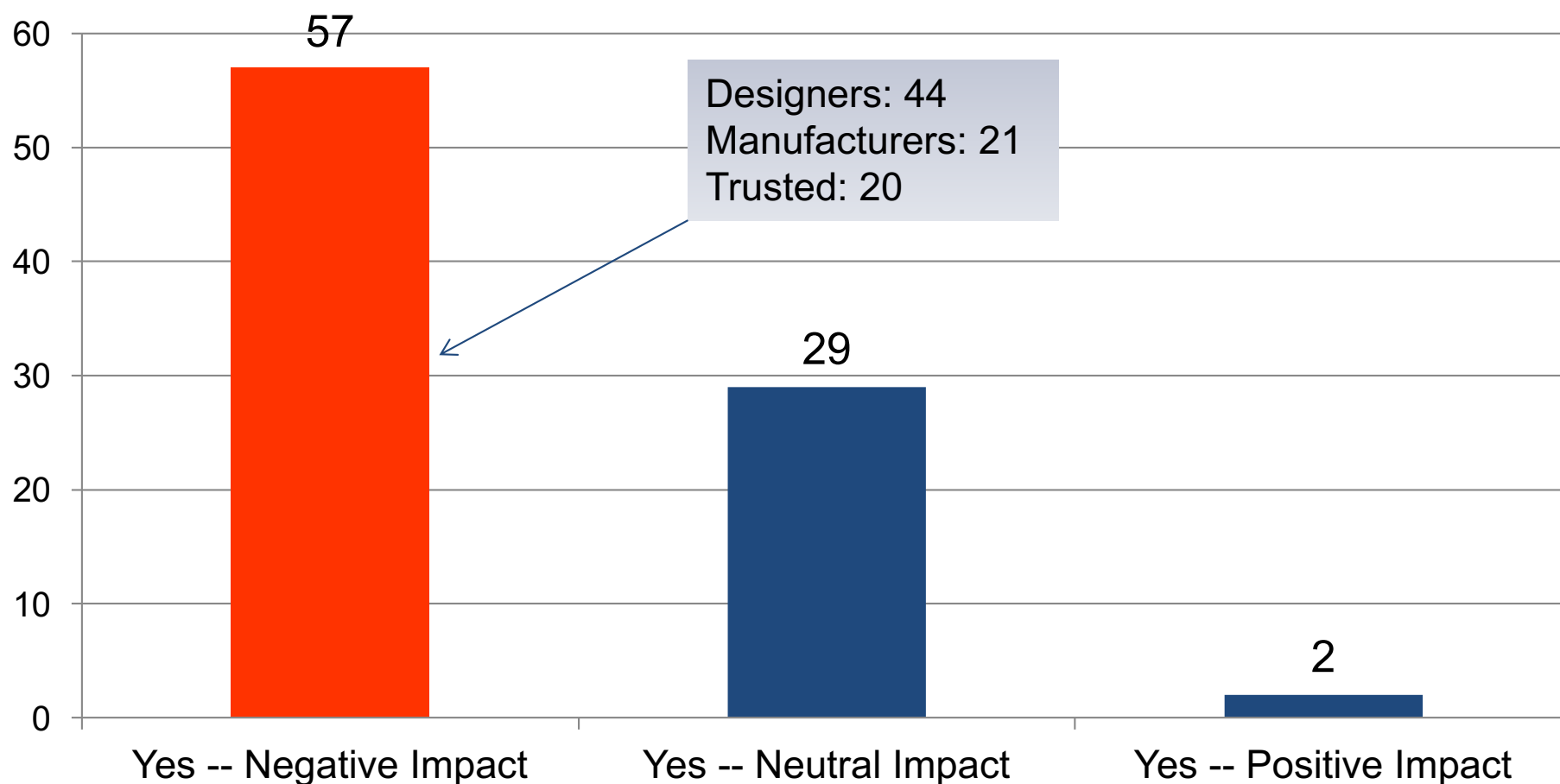


Source: U.S. Department of Commerce, Bureau of Industry and Security  
U.S. Integrated Circuit Assessment – 2017 – UNCLASSIFIED - Preliminary



# U.S. IC Design and Manufacturing Assessment

**Will your organization be impacted by Chinese acquisition of your suppliers of materials, equipment, software, and other items critical to your organization's supply chain?**

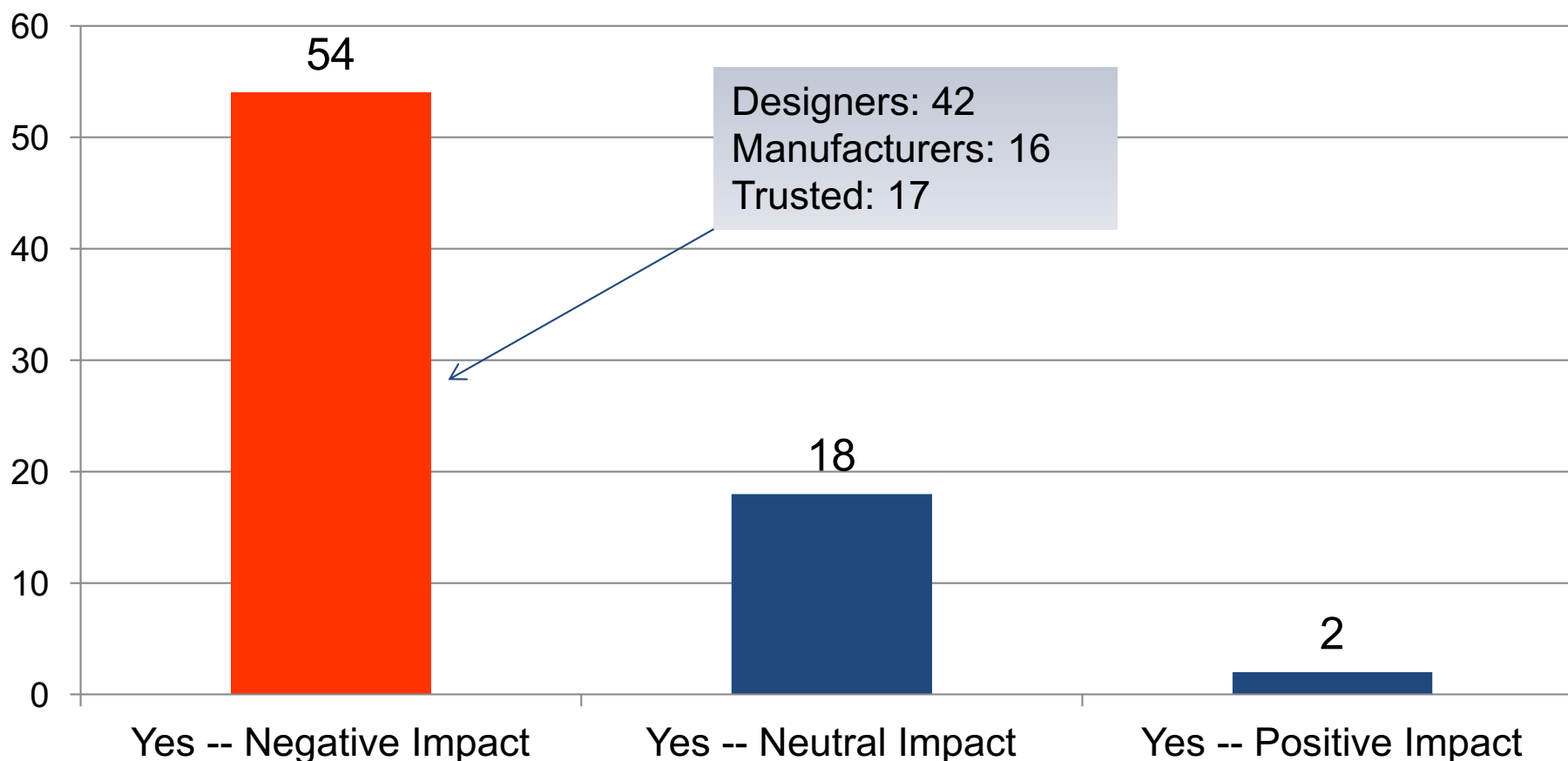


Source: U.S. Department of Commerce, Bureau of Industry and Security  
U.S. Integrated Circuit Assessment – 2017 – UNCLASSIFIED - Preliminary



# U.S. IC Design and Manufacturing Assessment

**Will your organization be impacted by Chinese acquisition of IC intellectual property (IP blocks) normally available under license?**

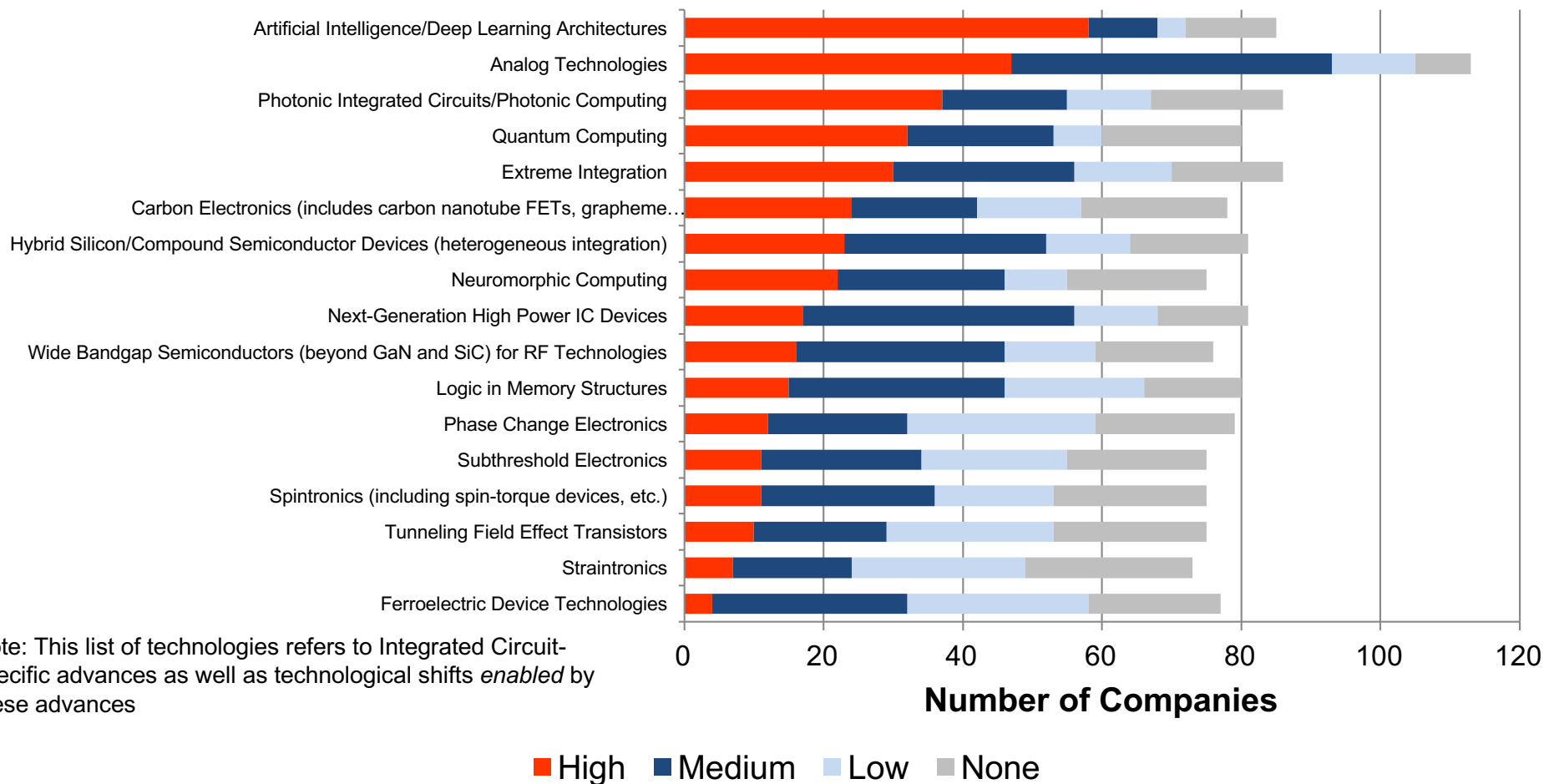


Source: U.S. Department of Commerce, Bureau of Industry and Security  
U.S. Integrated Circuit Assessment – 2017 – UNCLASSIFIED - Preliminary



# U.S. IC Design and Manufacturing Assessment Advanced Integrated Circuit Technologies

Degree of **Technological Advantage** in the Next 10 – 15 years for the Global IC Industry



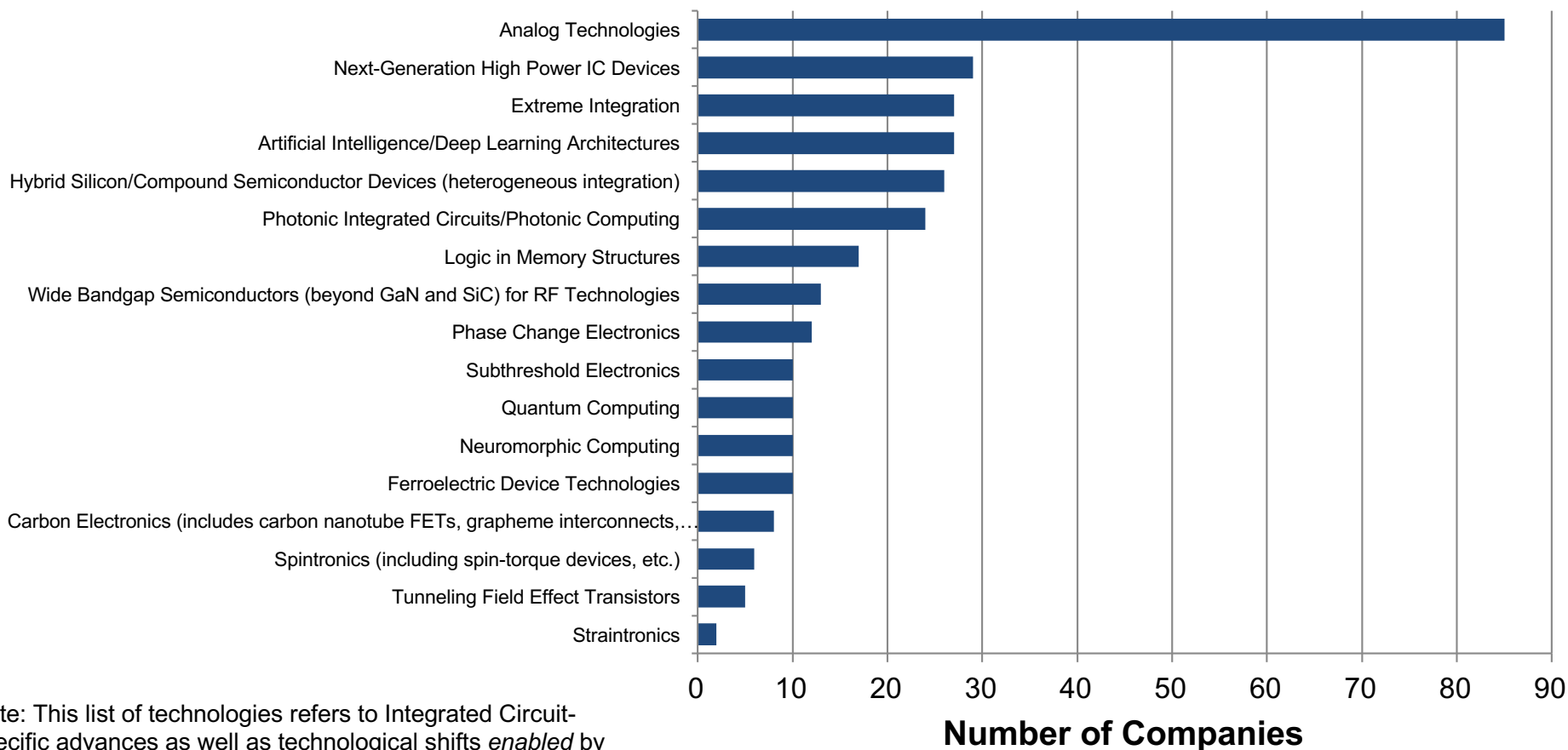
Note: This list of technologies refers to Integrated Circuit-specific advances as well as technological shifts *enabled* by these advances





# U.S. IC Design and Manufacturing Assessment Advanced Integrated Circuit Technologies

## Number of U.S. Companies Surveyed Currently Performing R&D on Advanced Integrated Circuit Technologies



Note: This list of technologies refers to Integrated Circuit-specific advances as well as technological shifts *enabled* by these advances

Sample Size: 133 Companies

Source: U.S. Department of Commerce, Bureau of Industry and Security  
U.S. Integrated Circuit Assessment – 2017 – UNCLASSIFIED - Preliminary



## BIS/OTE Contact Information

**Brad Botwin**

Director, Industrial Studies

(202) 482-4060

[brad.botwin@bis.doc.gov](mailto:brad.botwin@bis.doc.gov)

**Mark Crawford**

Senior Trade and Industry Analyst

(202) 482-8239

[mark.crawford@bis.doc.gov](mailto:mark.crawford@bis.doc.gov)

**Erika Maynard**

Special Projects Manager

(202) 482-5572

[erika.maynard@bis.doc.gov](mailto:erika.maynard@bis.doc.gov)

**John VerWey**

Trade and Industry Analyst

(202) 482-7842

[john.verwey@bis.doc.gov](mailto:john.verwey@bis.doc.gov)

U.S. Department of Commerce  
Bureau of Industry and Security  
1401 Constitution Avenue, NW  
HCHB 1093  
Washington, DC 20230

<http://www.bis.doc.gov/DIB>