Government Best Practices to Support Semiconductor Sector Innovation

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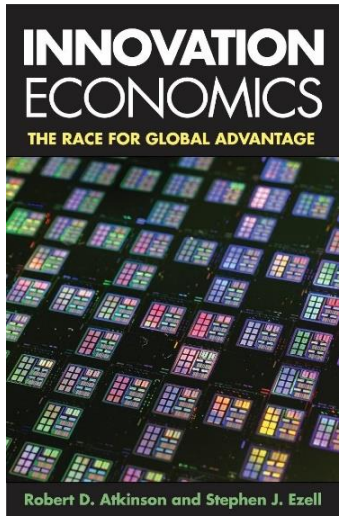
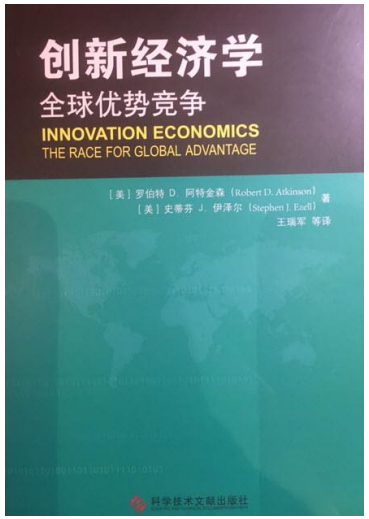
- Formulates and promotes policy solutions that accelerate innovation and boost productivity to spur growth, opportunity, and progress.
- Focuses on a host of issues at the intersection of technology innovation and public policy:
  - Innovation processes, policy, and metrics
  - Science policy related to economic growth
  - E-commerce, e-government, e-voting, e-health
  - IT and economic productivity
  - Innovation and trade policy





Today's Presentation

1 Maximizing Innovation in the Global Economy

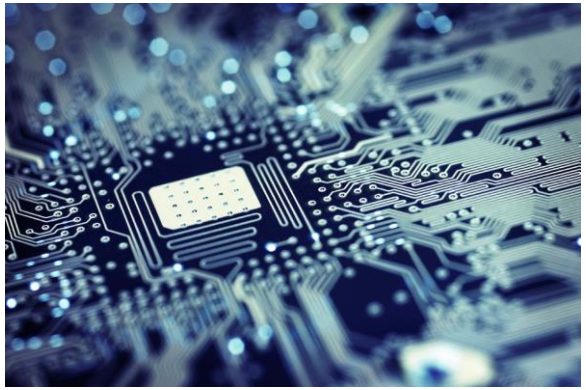
2 Maximizing Innovation in Semiconductors

Innovation Industries Share Three Distinct Characteristics

1. They compete by inventing next-generation products or services.

2. They are characterized by very high initial fixed costs (e.g., R&D and design), but very low marginal costs.

3. They embody and depend on intellectual property (IP).



Conditions Needed for Global Innovation to Flourish

1. Access to large markets (e.g., economies of scale).
2. No artificial, non-market-based competition.
3. No "forced localization requirements" that unnecessarily fragment global production systems.
4. Protection of IP rights.

Maximizing Semiconductor Sector Innovation

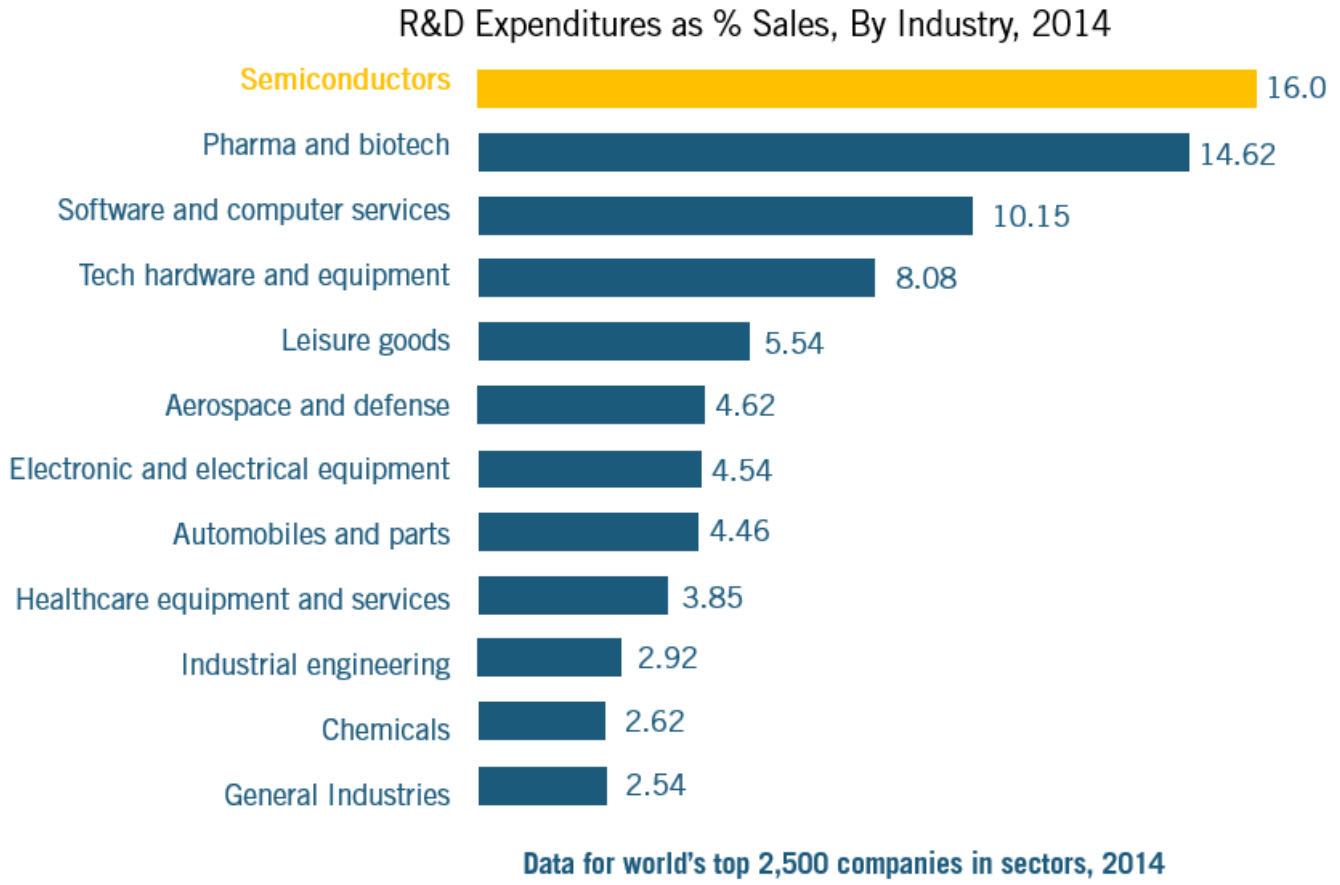
Appropriate Roles for Government

- Invest in basic and applied scientific research.
- Fund university R&D and industrial Ph.D.'s.
- Convene and fund sectoral PPPs focused on pre-competitive research, tech roadmaps, testbeds.
- Fund proof of concept grants for small businesses.
- Design tax policy to spur industrial competitiveness.
- Protect intellectual property rights (IPRs).
- Procure on a "best value" basis.

Inappropriate Roles for Government

- Erect barriers to semiconductor trade.
- Deploy import substitution policies.
- Fund private-sector M&A/FDI activity.
- Direct private-sector procurement.
- Provide weak IPR protection/enforcement.
- Restrict investment/immigration activity.
- Focus on national champions at the expense of innovative start-ups.

Invest Robustly in Semiconductor R&D



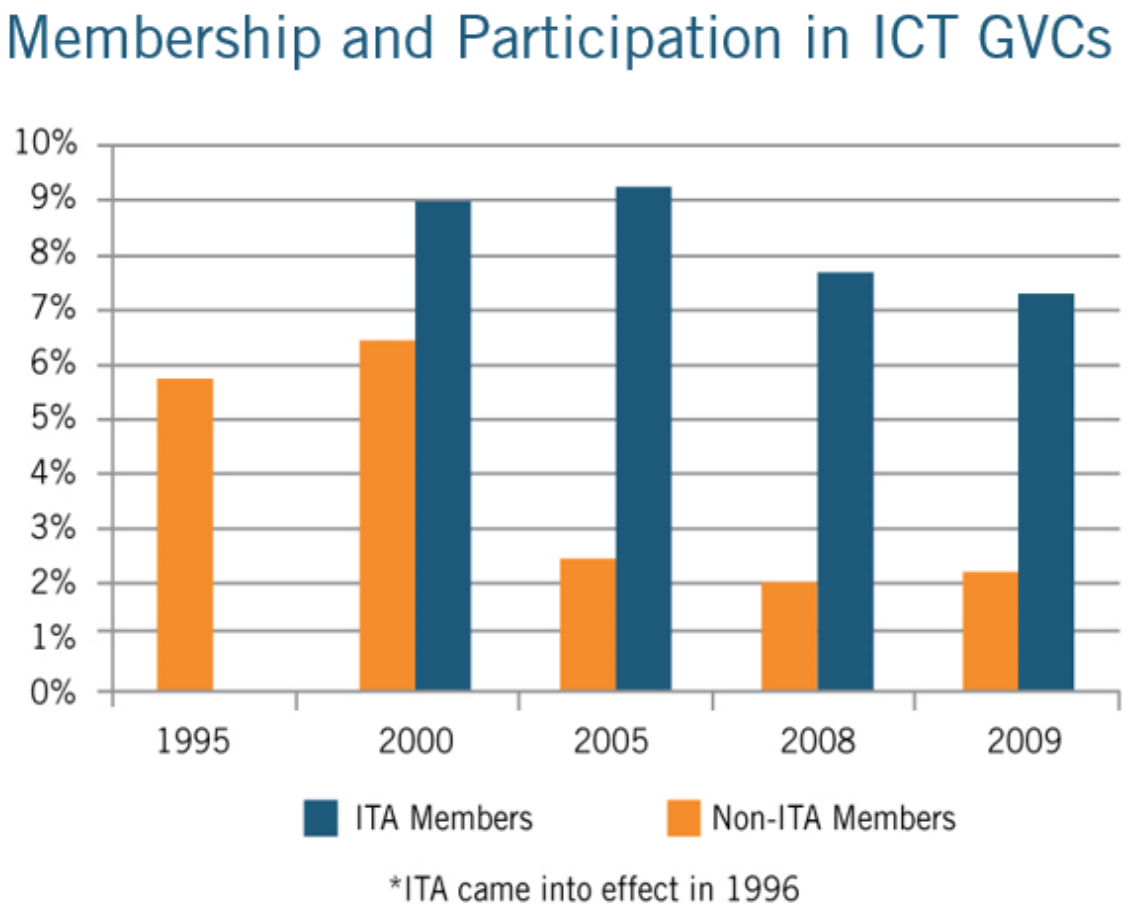
Source: *McKinsey on Semiconductors, 2017; SIA Factbook 2017*

Foster Semiconductor Sector PPPs

- Semiconductor Technology Advanced Research Network (STARnet)
- Engages 8 companies/46 universities to find paths around the fundamental physical limits threatening the long-term growth of the microelectronics industry.

- CEA-Leti helps companies performing micro- and nanotechnology research bridge the gap between basic research and manufacturing.
- 37 companies have been formed as Leti spinoffs, resulting in the creation of more than 2,500 jobs.

Embrace Open Trade Policy to Participate Fully in ICT GVCs



Source: OECD, *Implications of Global Value Chains for Trade, Investment, Development, and Jobs*, 2013

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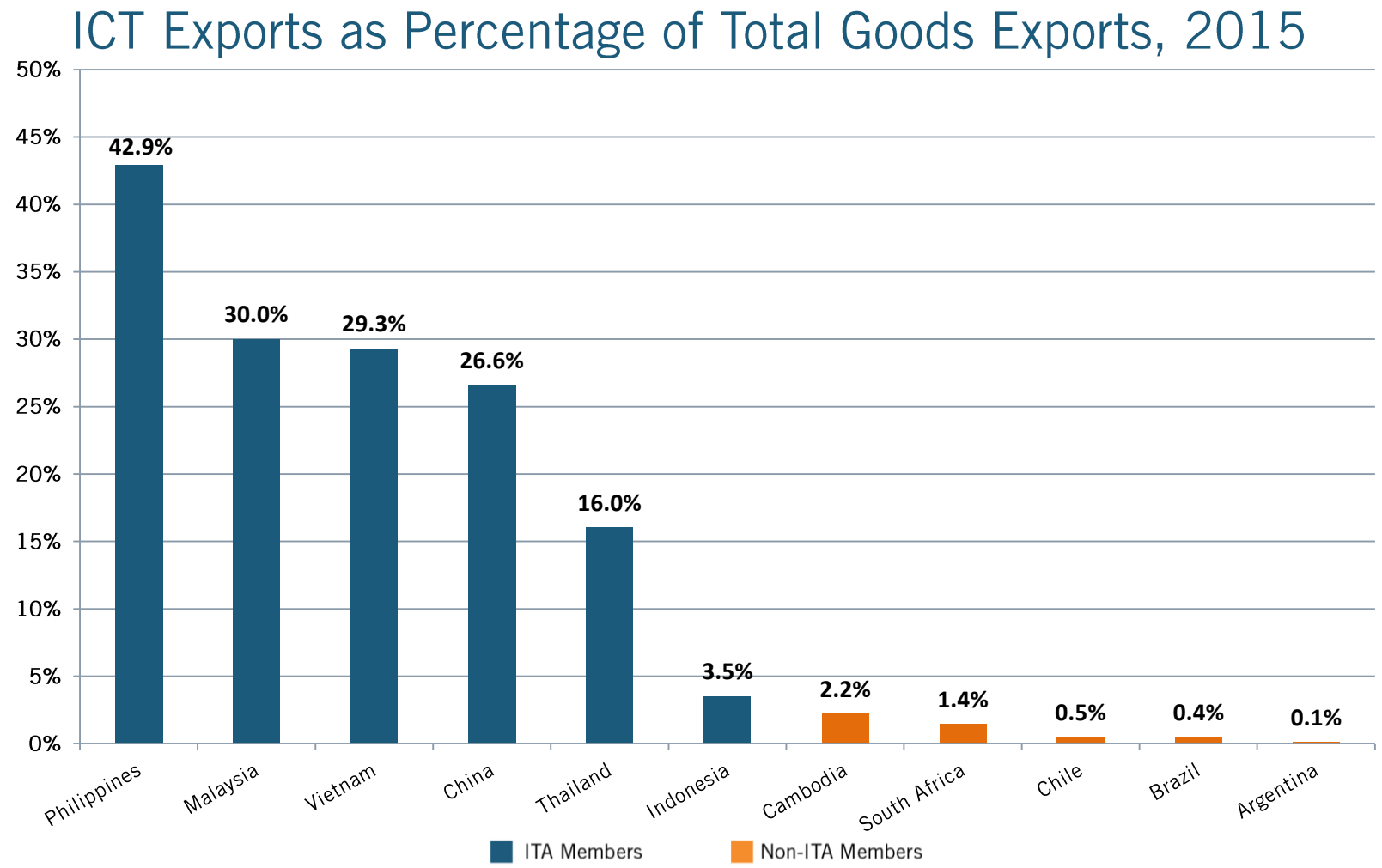

Source: World Bank

Government Intervention in Markets Usually Ineffective

- The value added by Brazil and India's semiconductor industry declined by 50% and 32%, respectively, from 2007-2014.
- Brazil's semiconductor exports 10% less in 2014 than 2000.

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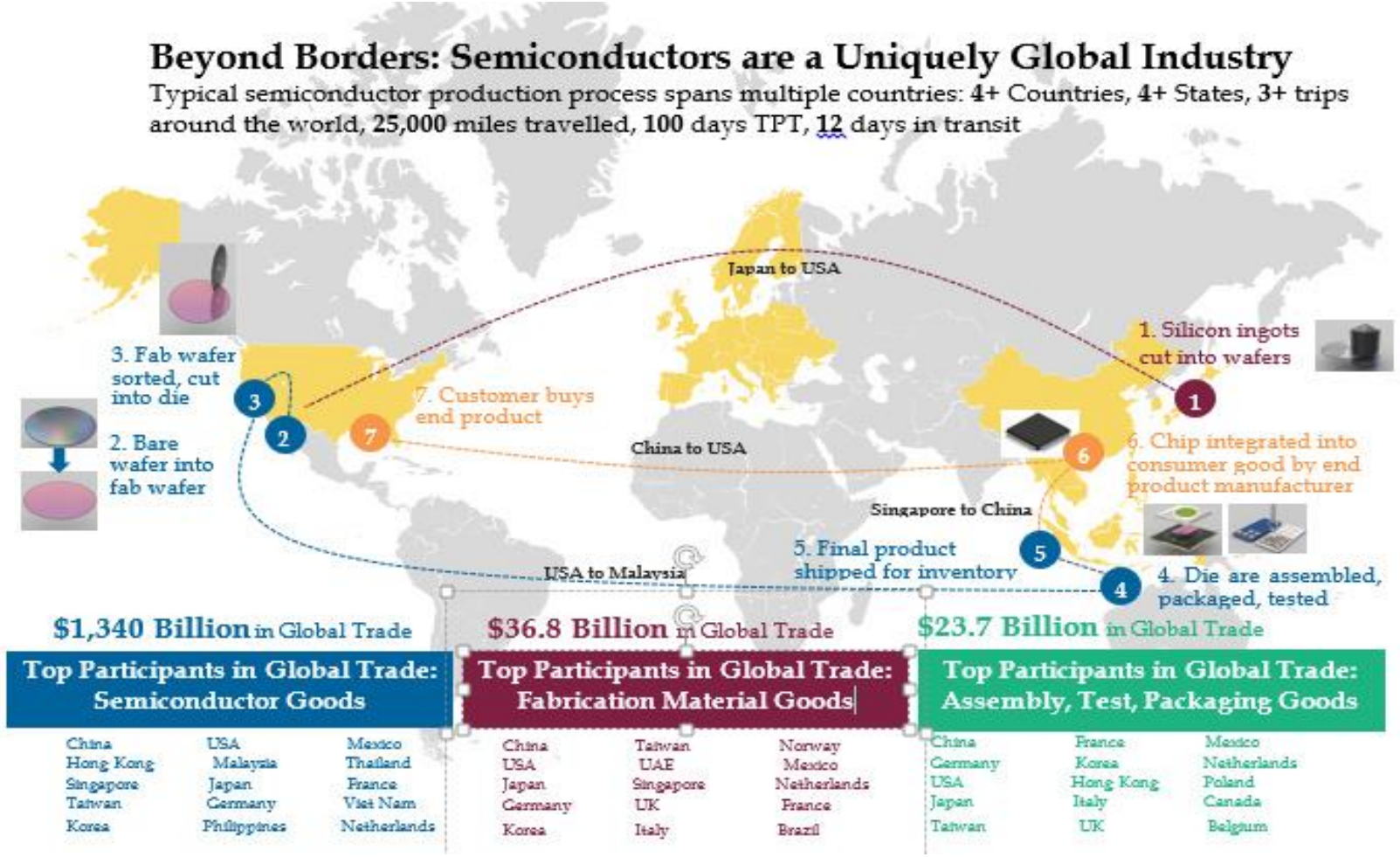
Preference for Domestically Manufactured Electronic Goods(PMA)

The Ministry of Electronics and Information Technology (MeitY) has notified the Policy for providing preference to domestically manufactured electronic products in Government procurement for its own use and not with a view to commercial resale or with a view to use in the production of goods for commercial sale on 23.12.2013.

Source: U.S. National Science Foundation, *Science and Engineering Indicators Report, 2016*

Global Supply Chains Maximize Production and Value



Source: Nathan Associates, *The Semiconductor Global Value Chain*

Summary

- Government intervention to create industries that aren't market facing are unlikely to achieve long-term success.

- When governments invest in industries' innovation capacity–e.g., science, talent, infrastructure, etc.–they're far more likely to foster enterprises that can flourish in market-based global competition.

Thank You!

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