China's Threat to Global Semiconductor Innovation

- China's $170 billion National IC Plan targets global semiconductor leadership.
- Seeks import substitution and autarkic outcome.
- Distorts global markets with massive subsidization, state-financed foreign firm acquisitions, IP theft, etc.



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Moore's Law Under Attack: The Impact of China's Policies on Global Semiconductor Innovation

STEPHEN EZELL | FEBRUARY 2021

China's mercantilist strategy to grab market share in the global semiconductor industry is fueling the rise of inferior innovators at the expense of superior firms in the United States and other market-led economies. That siphons away resources that would otherwise be invested in the virtuous cycle of cutting-edge R&D that has driven semiconductor innovation for decades.

KEY TAKEAWAYS

- No industry has an innovation dynamic quite like the semiconductor industry, where "Moore's Law" has held for decades: The number of transistors on a microchip doubles about every two years, producing twice the processing power at half the cost.
- The pattern persists because the semiconductor industry vies with biopharmaceuticals to be the world's most R&D-intensive industry—a virtuous cycle that depends on one generation of innovation to finance investment in the next.
- To continue heavy investment in R&D and CapEx, semiconductor firms need access to large global markets where they can compete on fair terms to amortize and recoup their costs. When they face excess, non-market-based competition, innovation suffers.
- China's state-directed strategy to vault into a leadership position in the semiconductor industry distorts the global market with massive subsidization, IP theft, state-financed foreign firm acquisitions, and other mercantilist practices.
- Inferior innovators thus have a leg up—and the global semiconductor innovation curve is bending downward. In fact, ITIF estimates there would be 5,100 more U.S. patents in the industry annually if not for China's innovation mercantilist policies.
- To address the challenge Chinese innovation mercantilism poses to the semiconductor industry, the United States needs to work with like-minded nations while enhancing its own innovation capacity in the sector.

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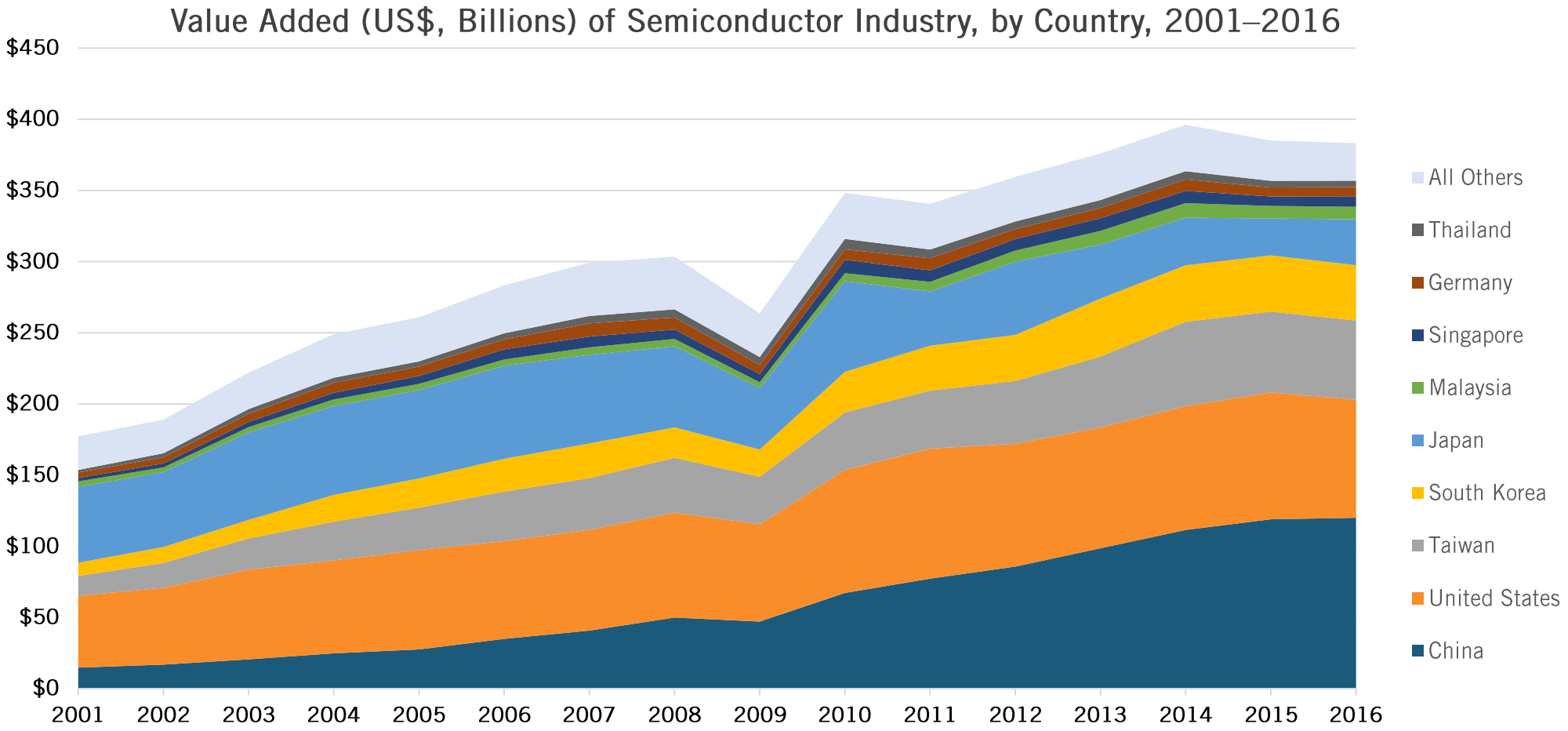
Source: ITIF, "Moore's Law Under Attack: The Impact of China's Policies on Global Semiconductor Innovation"

China Increasingly Capturing Global Semiconductor Market Share



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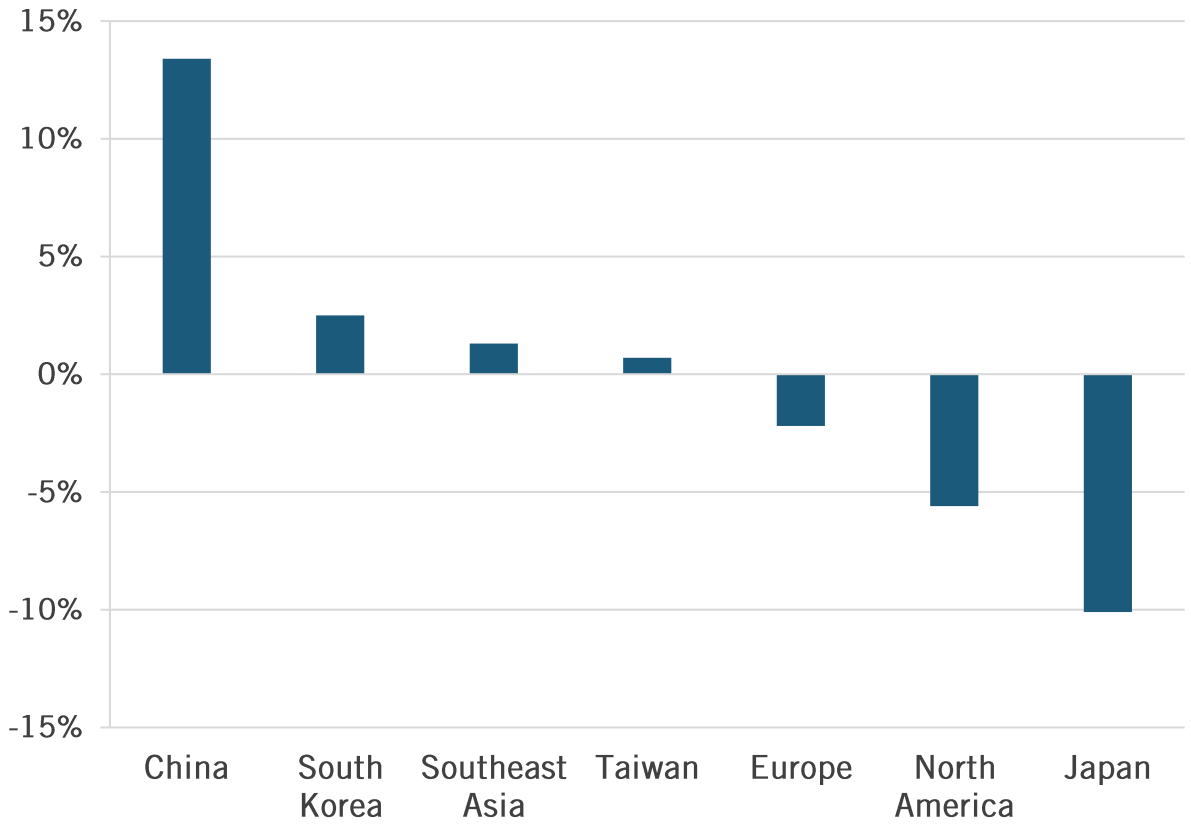
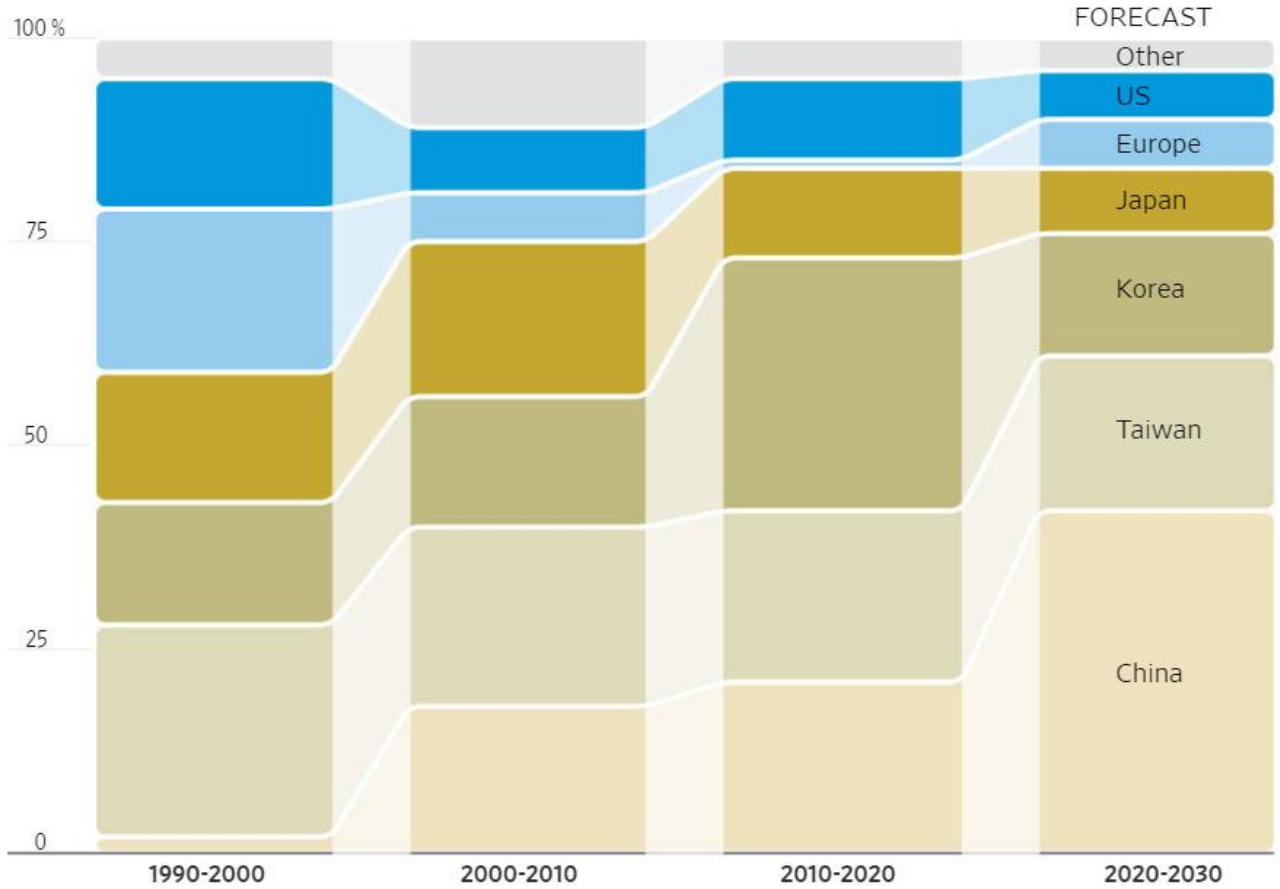
China Increasingly Capturing Global Semiconductor Fab Share

Change in Countries' Share Semiconductor Fab Capacity, 2007-21

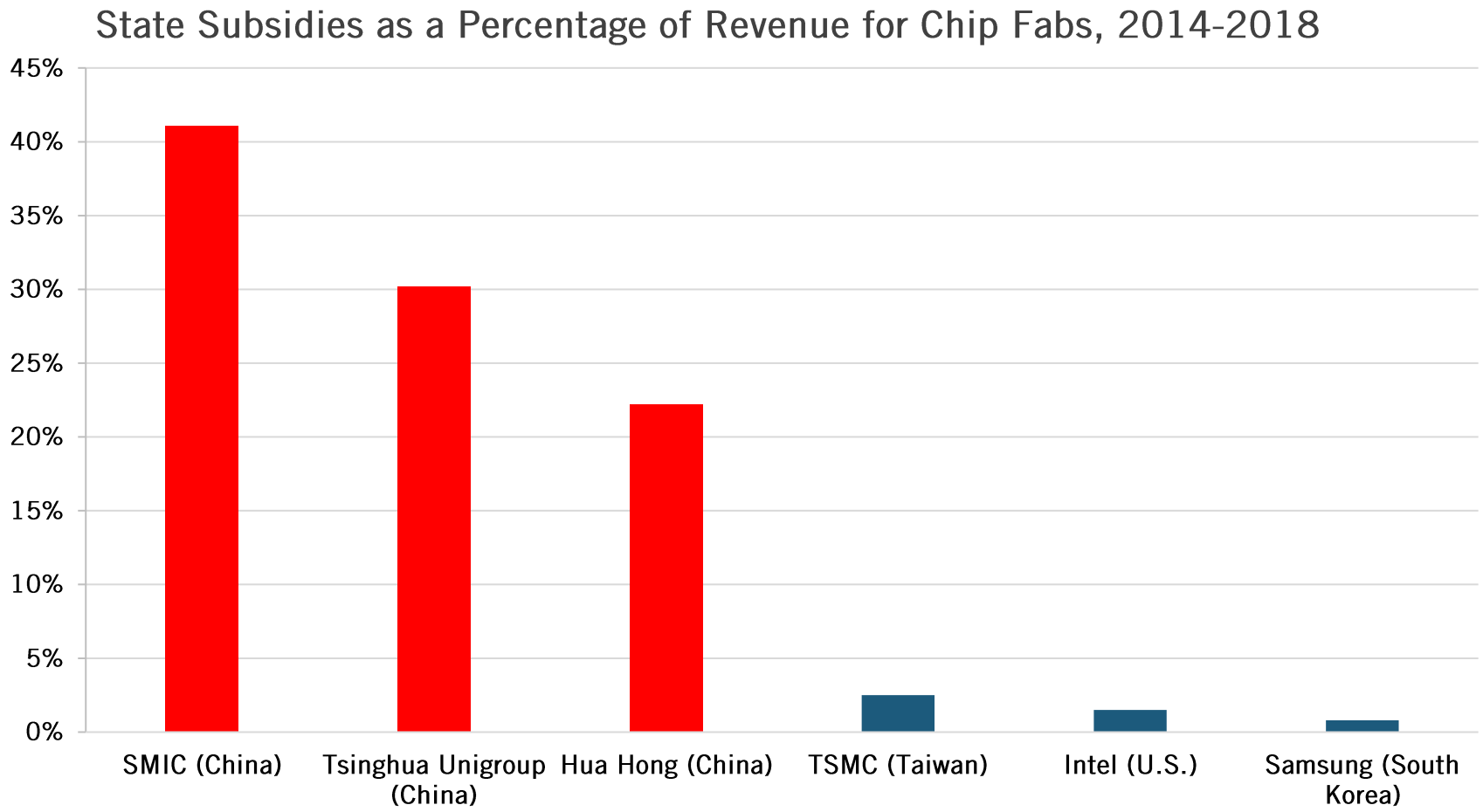


Countries' Share of Global Semiconductor Fabrication Capacity



Source: BCG and SIA, "Government Incentives and U.S. Competitiveness in Semiconductor Manufacturing"

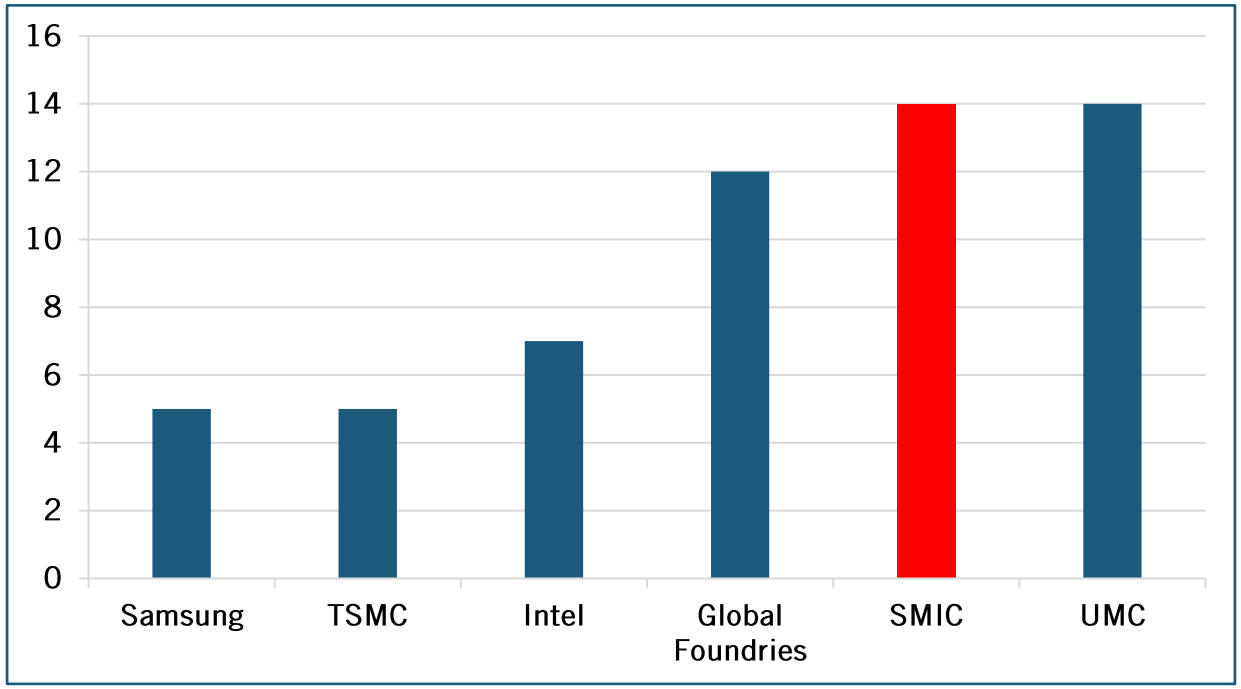
Chinese Semiconductor Firms Enjoy Substantial Subsidization



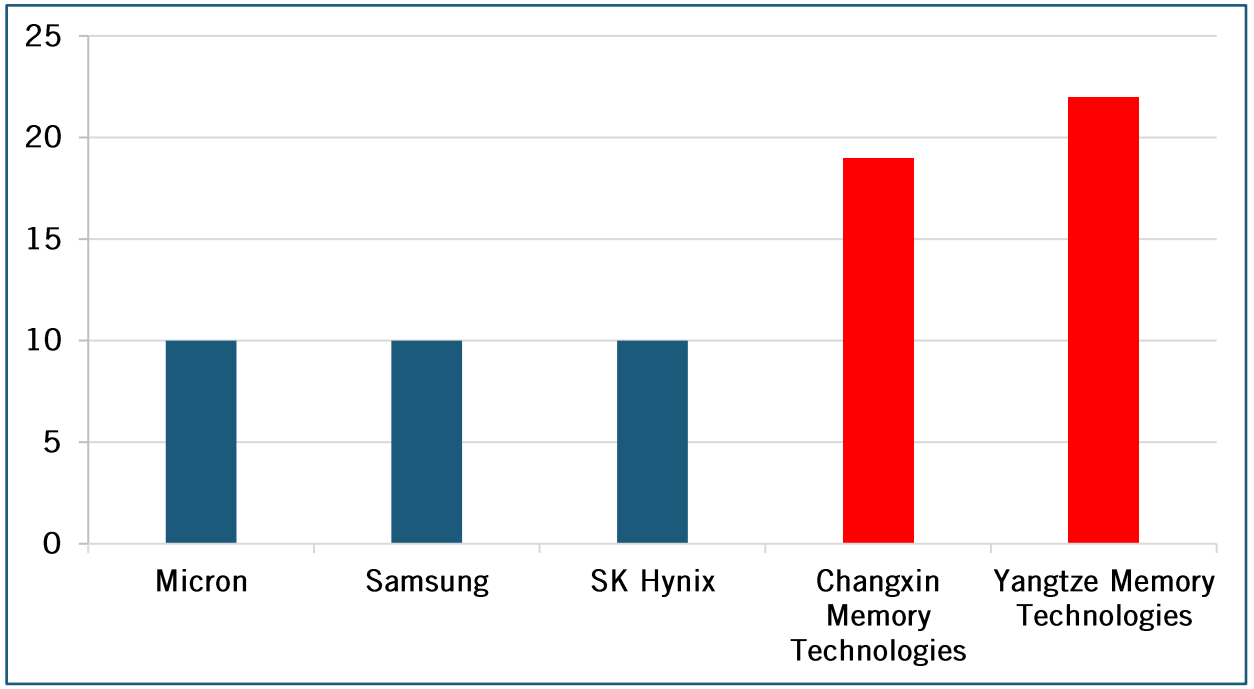
Source: Khan and Flynn, "Maintaining China's Dependence on Democracies for Advanced Computer Chips"

China's Semiconductor Firms Not Nearly as R&D-Intensive

Most-Advanced Logic Semiconductor Manufacturers (nm)



Most-Advanced Memory Semiconductor Manufacturers (nm)



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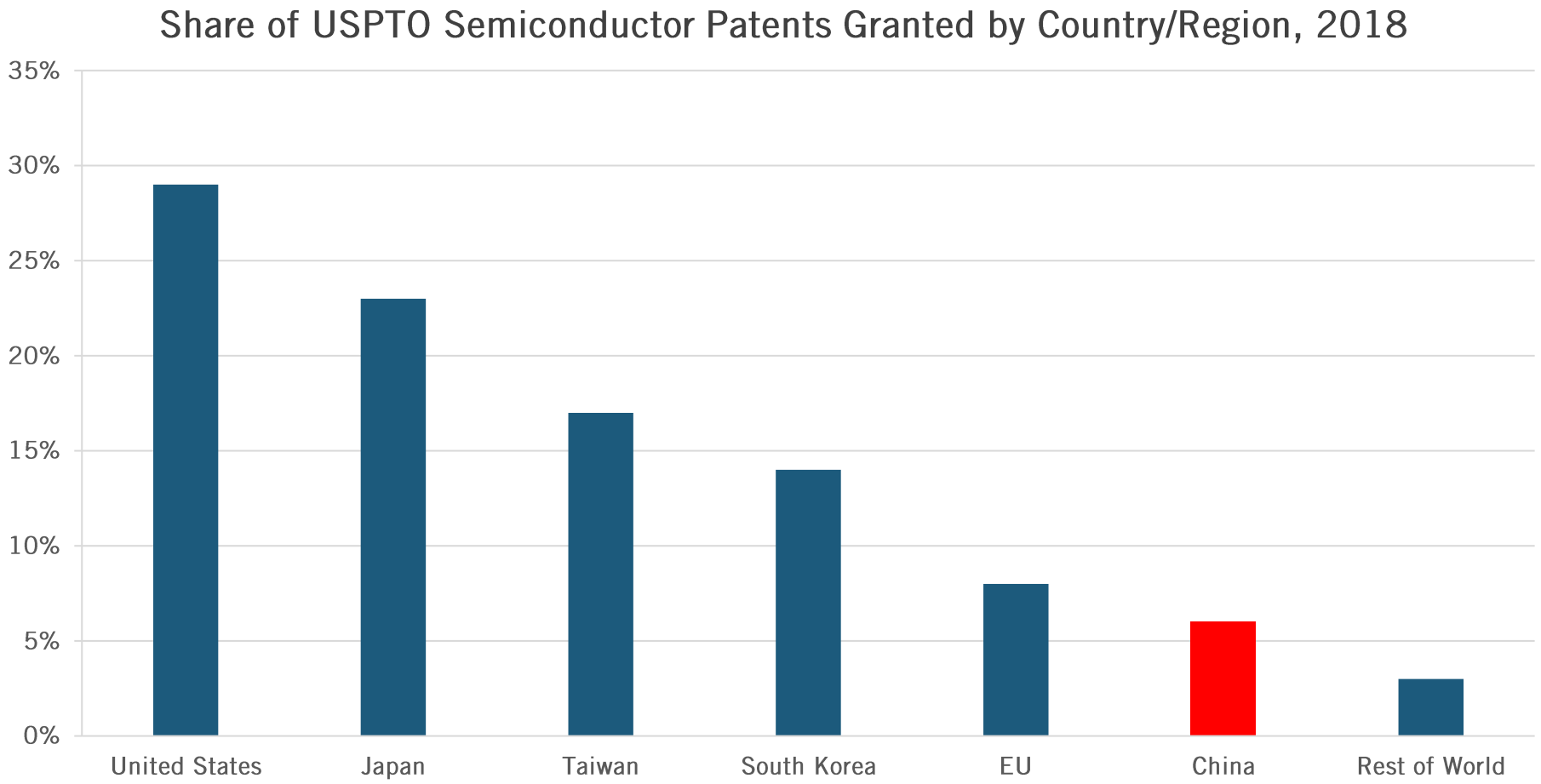
China's Semiconductor Firms Not Nearly as Innovative



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