Will China Take the Semiconductor Industry lead from US? Is Intel going “fab lite” the beginning of “The End”?

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Lots of moving Parts & Players in the chip drama
Technology, Politics, Global Domination and of course….Money

- Made in China 2025- Spending $100B+ to get there
- Intel has fallen on its own sword
- TSMC / Taiwan is a short boat ride from reunification with mother China
- Are semiconductors following other industries overseas?
- Huawei was a “call to arms” in China’s self determination
- Dominate chips and you dominate defense technology/intelligence
- $22B Chips for America & TSMC Arizona fabs are barely rounding errors
- Still selling China the “rope to hang us with” – semiconductor equipment
- Will chip design follow chip manufacture to China?
China has both the funding and the resolve “Made in China 2025”…

- China consumed 60% of chips but made only 15%
- US cutting off Huawei only accelerates desire to dominate chips
- Chinese government and industry are aligned – unlike US
- What can’t be bought can be copied/stolen - Jinhua
- $100B+ checkbook to buy and build semiconductor capacity
- China is the biggest spender on semiconductor equipment today
- US has talked about but failed to implement restrictions on technology sales
Intel stumbles in technology race don’t help
TSMC is “relentless” as SMIC & other China fabs spend

• Intel is going to a “fab lite”/hybrid model using TSMC
  – It’s the only solution to satisfy customers & keep up with Moore’s Law
  – 10NM & 7NM slips are not recoverable
  – Apple figured out trajectory and went its own way (with TSMC)

• TSMC has had “perfect” execution
• SMIC and China domestic fabs are on a “catch up” spending spree
• Intel & AMD will look more similar over time- more competitive-lower value
• Samsung is also behind TSMC with trouble keeping up
TSMC & China reunification “not if but when”
Is resistance futile?

- Could China’s absorption of Taiwan repeat Russia’s Crimea take over?
  - What would the US do? If anything…
- China’s growing influence around the world & South “China” Sea
- Getting TSMC would mean getting semiconductor dominance
- TSMC prize likely worth the risk
- Actions in Hong Kong look like predictor of Taiwan play book
Are semiconductors just following other industries to China? Chips are more critical than pharmaceuticals which already moved

- What isn’t made in China today?
- What did China do to Solar and LED industries?  
  - With government help
- Pharmaceuticals? - The US no longer produces its own drugs
- Steel? US steel industry decimated
- Electric vehicles? Tesla’s first factory outside the US was in China
- Rare earth elements are primarily sourced in China
- If China dominates semiconductor & medicine, they have more leverage
Huawei amplifies China’s desire for semiconductor dominance

- Cutting off Huawei demonstrates the US’s ability & use of leverage
- Jinhua was also a prime example- Now a $Billion hole in the ground
- ZTE was a “warm up” for Huawei cut off
- Tik Tok could be the next large Chinese tech company
- The US has threatened to cut off China from the dollar payment system
- China hasn’t used its leverage (rare earth) but the US has used its leverage
- It is not much different than the nuclear arms race where the US had leverage until others developed “the bomb” but the US was the only one to use it, with devastating effect- China has no choice but to develop semiconductor technology or remain forever subservient
Semiconductors are key to military & intelligence dominance

- US military dominance is due to advanced weaponry & communications
  - All driven by semiconductor technology
- Intelligence gathering is increasingly dependent on technology “assets”
  - Drones, satellites, image/voice recognition, AI, encryption
- Internal population monitor & control based on facial recognition in China
- Semiconductors drive the modernization of economies to information based
- China has a goal of passing the US in global domination and dominating technology (semiconductors) is the key ingredient as China has more people, land, resources and soon …money….plus the political will
"Chips for America" is a small start, not a solution

- $22B is less than what China is spending per year on chip equipment alone
- Proposed Arizona TSMC fab is too small & too late to be impactful
  - Wafer capacity is a rounding error- 5NM is obsolete when the fab is complete
- With Intel delay, US is behind Asia (TSMC) in Moore’s Law
  - GloFo puts US very far behind in Foundry – stuck at 14NM
- Chinese government deeply involved in funding semiconductor projects
  - US chip makers get no help- cost, environmental issues hurt competitiveness
- Financial incentives should be coupled with disincentives & directives
  - Intel increasing outsourcing to Asia while talking about US revitalization
- Semiconductor workforce, education & basic R&D need improvement
We are “selling China the rope they will use to hang us with”

• China is the biggest market for semiconductor equipment today  
  – More fabs projects than the rest of the world combined
• Less restrictions on sales than in the past- rules exist-but not enforced
• We have stopped ASML sales but not Applied, Lam, KLA or TEL
• “Technology Transfer” still exists
• Technology Theft remains rampant – Micron/Jinhua aided by UMC
• Little difference between China domestic fabs and foreign owned
• Restrictions need to be coordinated with Japan, Korea, Dutch etc;
Will chip design expertise follow chip manufacture expertise?

- Some say it has already happened…HiSilicon
- EDA companies appear unrestricted in China – Selling EDA tools
- Easier to copy/steal EDA tools and design compared with chip tools
- Design expertise may be faster to organically develop
- Existing design libraries make development faster & easier
Summary

• The complete loss of the semiconductor industry can be prevented or slowed
• Reversing the existing loss is likely more difficult or impossible
• Investing more heavily now could prevent bigger future losses
  – Maintaining dominance could help prevent conflict with a stronger China
• Help needed for foundry, logic and memory – not just foundry
• US needs to decide on security & leadership over profits
• Industry can’t do it alone – also needs more than token incentives
• Likely more important than oil, steel, pharmaceuticals & other “lost” industries