High Tech Geopolitics

Trends, Misconceptions, and Creative Insecurity

Pranay Kotasthane

Takshashila Institution

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The Big Picture

I have **three arguments** for you today.

1. Technology has become both **a means and an end** of geopolitical contestation. Politics of the current age is for technology, of technology and increasingly by technology. (Nitin Pai, *India must take several paths to AI power*)
2. There are **four widespread misconceptions** about tech geopolitics. Getting them wrong leads to bad strategy for governments and for firms.
3. Capable powers don't just comply or resist. They **workaround**.

But First: How Did We Get Here?

The globalised high-tech economy wasn't built through coercion. It was built through comparative advantage.

- Firms established GCCs, offshored design, transferred technology — because it was **advantageous to them**.
- Every country that built a local semiconductor industry began with US technology transfer. *Including China.*
- China competing with the US isn't proof the system was rigged. It's proof the system *worked*.

The weaponisation kicked in when the powerful realised the positive-sum game had worked too well — when the catch-up threatened the lead.

Trend 1: Trade Wars Are Largely Tech Competitions

- The emphasis on the importance of high-technology to national power means that governments are willing to incur the costs of high-technology decoupling.
- **Practice of tech geopolitics precedes its theory.** Export controls on semiconductors, AI diffusion rules, critical mineral restrictions — governments acted first, then rationalised.
- Tech decoupling might happen at the level of **materials, machines, humans, and values**. The precise pathway will be technology-specific.
- Not a 'War'.

Trend 2: Creative Insecurity Produces Non-Linear Breakthroughs

When a nation-state enjoys a state of **creative insecurity**, its rate of innovation will tend to accelerate.[1]

- 1980s: the US feared a cobalt shortage for jet engine superalloys. Result: molybdenum substitutes and composite materials emerged within years.
- 2023–25: China's AI labs, denied the most advanced GPUs, built **DeepSeek** — competitive with frontier models on constrained hardware.
- 2020s: Japan, cut off from Chinese rare earths after 2010, **halved its rare earth consumption** and dropped China dependence from 90% to 60%.

The pattern: denial triggers innovation. Every embargo has a shelf life.

[1] Taylor, Mark Zachary. 2016. *The Politics of Innovation: Why Some Countries Are Better than Others at Science and Technology*.

Trend 3: The Era of the Stateless Corporation Is Over

- There is likely to be **higher alignment between private high-technology players and their national governments**.
- Some companies will hedge, most others will comply. Intel's stance on China, bricked stolen tractors in Ukraine, domestic technology industrial policies across the G7.
- **Every major tech company is now a geopolitical actor** — whether it wants to be or not. The question for firms is which side of the bifurcation they position on.
- China's Decrees 834, 835, and 837. Counter-regime-compliance-regime.

Trend 4: Selective International Cooperation, Not Multilateralism

- iCET, TRUST, AUKUS, Quad, Mineral Security Partnership, Chip 4 — these are **plurilateral coalitions**, not multilateral institutions.
- They are built around **complementary capabilities**: I have design talent, you have manufacturing, they have raw materials — let's pool.
- This is cooperation, but it's cooperation shaped by geopolitical alignment. Countries excluded from these coalitions face compounding disadvantages.

Trend 5: Someone Pays for Fragmentation

- Additional capacity due to geopolitics will create **10% inefficiency** in total wafer capacity by 2030 (ASML, 2022).
- "A very serious decoupling scenario could cost up to **7 percent of global GDP**" (Gita Gopinath, IMF).
- Costs of fragmentation fall disproportionately on **developing countries and consumers**.
- Domestic production requirements will become inevitable across high-tech sectors — and the tab lands on consumers and taxpayers, not on the geopolitical strategists.

1. New Tech = Old Tech? No. They Are Fundamentally Different.

Cellphones, advanced chips, AI stack

Space powers don't always become chip powers. Some domains are technically complex but **operationally simpler**. For space and nuclear sectors:

- Small output demand
- Manageable capital outlay
- Shorter supply chains that can be indigenised substantially

Semiconductors, AI training infrastructure, are the opposite: hyper-globalised, capital-devouring, with choke points at every stage. **Civil technologies are now far more cutting-edge than military ones.**

2. Tech Sovereignty Is Paramount? No. Tech Power Matters.

- Sovereignty/Self-sufficiency (*Atmanirbhar*) vs Self-strength (*Atmashakti*)
- **Think Tech Power**: the ability to get the tech you want when you need it and to deny someone else from having that tech when they need it.
- Self-sufficiency is a strategy for countries that can't get allies. Tech power is a strategy for countries that can.
- Alternate visions:
  - building base capabilities (open source, fab),
  - innovation policy (talent and R&D), and
  - **asymmetric dependence** — becoming so good at one thing that restricting you is costly for everyone.

3. Dependence = Vulnerability? Not Necessarily.

The case of China's Gallium & Germanium export controls vs US semiconductor export controls is instructive. **Three tests** determine whether a dependency is weaponisable:

- **Substitutability**: Can the buyer switch? Ga/Ge have substitutes. EUV lithography does not.
- **Supply chain dominance**: How concentrated is control? EDA tools: 97% US. Rare earths: 80% China for processing, but reserves exist elsewhere.
- **Acquired capability gap**: What does it take to build capability? This varies enormously across sectors.

The case of rare earth magnets is instructive: vital but not indispensable.

4. China Has the Upper Hand? No. Its Tech Stack Is Vulnerable.

Linear projection models don't account for:

- The FDI-led technology transfer party is over — across semiconductors, AI, and biotech.
- The US still remains a vibrant destination attracting the best tech talent from across the world.
- Diffusion rates for Chinese tech products are lower than assumed (Ding, 2024).
- Digital exports face a trust deficit (TikTok in Taiwan, Huawei in Europe, Chinese AI models globally).

But creative insecurity cuts both ways: if DeepSeek can compete without the best GPUs, others can find alternatives to Chinese rare earth magnets and battery materials too.

A Framework for Tech Geopolitics

Assumed Impact on National Power	Strategic Objective	Instruments Used	Underrated Repercussions
Technology X underlies other critical & emerging tech	Denial	Secondary Sanctions	Difficult to sustain; incentives for backroom deals with adversary
		restrictions on movement of high-tech labour	Can slow down technical progress
		Export controls, End-use restrictions	Encourages adversary to build local capacity in a focused manner
		Investment restrictions	Can slow down technical progress
	Outpace adversary	industrial espionage to steal secrets, targeted poaching	Invites stricter controls on professionals from the stealing country
		Build partnerships for resilience	Self-sufficiency is a myth.
		Indigenisation and industrial policy	Difficult to sustain.
		Sabotage	Self-damage
		Increase dependence and control	Helps manage the adversary's pace to an extent
	Remove major bottlenecks	Promote Open Source	Still a nascent field
		Build partnerships	Self-sufficiency is a myth.
Technology X can have direct cognitive effects	Influence minds and actions	Espionage	Limited impact on national power
		Decouple information flows	
		Disinformation	

Figure 1: Source: Author

The Rise of "Bipolar Corporations"

Figure 8.3 Enterprise-Level Business Capabilities Versus Geotech Statecraft

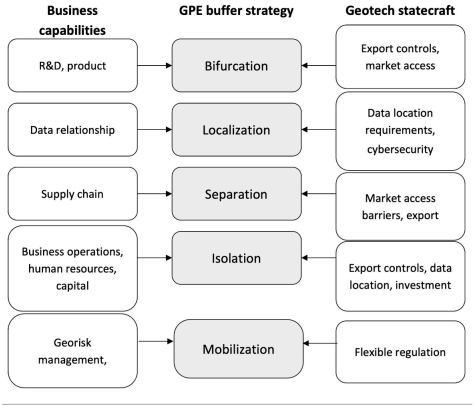


Figure 2: Source: Tech Cold War, Baums and Butts

The Framework Explains the Powerful. What About Everyone Else?

Weaponised interdependence theory tells us how the powerful coerce. But what do countries caught in the middle actually do?

They don't just comply. They don't just resist. They **workaround**.[2]

Here are some provocations across domains. I want us to discuss what patterns emerge.

[2] Mahrenbach et al, *Workarounding While the International Order Fractures*, Quincy Institute

The Pattern

- **The powerful weaponise the structure. The others workaround it. And the workarounds eventually reshape the structure.**
- Workarounds succeed when the choke point fails one of the three tests: the product is substitutable, supply isn't fully concentrated, or the capability gap is closeable.
- Rising prices of controlled materials are not a problem but a **pathway to a solution** — they fund the substitutes.

What patterns do you see? Where does this logic break down? What workarounds am I missing?

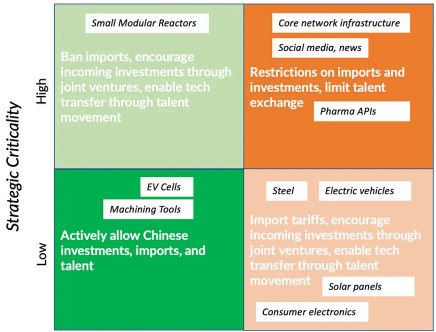
India's Position

1. India has its own complementary strengths in this domain. The foreign policy outlook on tech is **not defensive**.
2. Likelihood of technology transfer/upgradation is higher than during the Cold War — the US needs partners.
3. **Human Capital is India's potential strength** — the US faces a 300,000 engineer shortfall by 2030. India's GCCs are the world's largest pool of chip design talent.
4. Plurilateral cooperation is a necessity and not a choice.
5. Excessive focus on base capabilities and not enough on **asymmetric strategies**.
6. Leverage is exhaustible. It gets created through dense interrelationships.

India's Techno-strategic Stance on China

A framework for India's approach towards Chinese imports, investment, and talent — calibrated by strategic criticality and existing export capabilities of Indian firms.

A Framework for India's Approach Towards Chinese Imports, Investment, and Talent



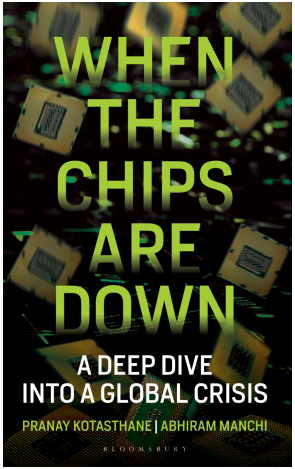
India's Leverage Options Against the US

Asymmetry of Vulnerability	High US Political Salience	Low US Political Salience
High (US more exposed)	**SWEET SPOT** **Act here. Maximum leverage, maximum pressure.** • Defence procurement redirection • SAMR-like regulatory mechanism for digital/telecom market access • California almonds and agricultural tariffs • Generic pharmaceutical supply	**SLOW BURN** **Effective but won't force quick recalculation.** • Foundational agreement freeze (LEMOA/COMCASA/BECA) • Joint military exercise cancellations • Quad cooperation degradation • UN/multilateral voting realignment • Strategic coordination with BRICS
Low (India also exposed)	**DETERRENCE SHELF** **Maximum value as un-activated credible threat.** • GCC regulatory uncertainty (1,600+ centres, 1M+ employees) • Broad tariffs on US agriculture • Data localisation mandates on US cloud platforms	**DEAD ZONE** **Don't bother. No leverage, no impact.** • Symbolic ambassador recalls • Cultural boycotts • Restricting sectors where India is more dependent

Figure 4: Source: Author

Things to Remember

1. **Tech trade was positive-sum for decades.** The weaponisation is the exception, not the rule. It was triggered when catch-up threatened the lead.
2. **Not all dependences are vulnerabilities.** Substitutability, supply chain dominance, and the capability gap — three tests, one diagnostic toolkit.
3. **Middle powers workaround.** Japan halved rare earth use. DeepSeek exists. RISC-V is growing. The structure is not static.
4. **Think strengths, not self-sufficiency.** *Atmashakti*, not *Atmanirbhar*.



References and Further Reading

Taylor, Mark Zachary. 2016. The Politics of Innovation: Why Some Countries Are Better than Others at Science and Technology. New York, NY: Oxford University Press.

Baums, Ansgar, and Nicholas Butts. 2025. Tech Cold War: The Geopolitics of Technology. Boulder, Colorado: Lynne Rienner Publishers, Inc.

Ding, Jeffrey. 2024. Technology and the Rise of Great Powers: How Diffusion Shapes Economic Competition. Princeton Studies in International History and Politics. Princeton: Princeton University Press.

'India's Doctrine for Technological Governance'. The Takshashila Institution. https://takshashila.org.in/research/a-techno-strategic-doctrine-for-india.

'Chandrayaan and Chips: Space Lessons for India's Semiconductor Program? | Center for the Advanced Study of India (CASI)'. https://casi.sas.upenn.edu/iit/pranaykotasthane-abhirammanchi.