

# Chipping Away At China's AI

## Contents

- 01 Arms Controls for Advanced AI Chips.
- 02 AI Technology is Too Important to Lose
- 03 Contested Leadership: AI Matchup.
- 04 China Tech Ban Defensive Tactics.
- 05 Independence, not Insanity: China Tech Strategy.
- 06 Size Matters: Technological Leverage in Conflict
- 07 'Mow the Grass' Strategy: Leveraging Tech.
- 08 Chips Good, Tech Bad: Sector Implications

## Executive Summary

- **No design arounds in new restrictions:** The new October 2023 export controls are tighter for AI chips and semiconductor equipment going into China by 1) closing technical loopholes to only allow 5-year-old GPUs, over 10x less powerful than the leading edge and 2) to control exports to additional 'countries of concern' akin to arms controls. It will be unlikely that Nvidia can design around the new controls in a meaningful way. Huawei's best GPU already exceeds the limitations of the restrictions, so fabricating this chip locally will be China's best option, alongside older Nvidia chips to meet local demand.
- **US is well ahead in AI:** The US currently has a multi-year lead on China in AI owing to starting earlier, more VC investments, depth of talent and AI hardware advantages. Entities in the US publish 70% of the most cited AI papers, and US AI unicorns hold almost 80% of the total enterprise value of AI unicorns globally.
- **The *Chip Choke* strategy has morphed into a *Mow the Grass* strategy:** Large platforms like the entire industrial base of a powerful country are adaptive and resistant to narrow strategic targeting. The '*Chip Choke*' strategy initiated by President Trump has morphed into a '*Mow the Grass*' strategy, which cuts off threatening or high value targets. This has the unintended consequences forcing Chinese innovation in chip manufacturing; however, it also diverts China's resources into catching up. China, which once aimed for complete technological dominance, now finds itself having to selectively focus on key technologies.
- **Too early to say the restrictions have failed. China chips boom while AI suffers:** While China's Hyperscalers have managed through restrictions with scale and inventory, AI startups have floundered. Up to 80% of raised capital for an AI startup can go into compute resources, and without access to American chips, AI VC in China has become suicidal. China AI VC has shrunk over 90% from its peak of \$30B in 2018 down to \$2B in 2023, while the US peaked at \$120B in 2021 and is down to \$50B in 2023.
- **Beijing's policies that hinder China's tech sector are a feature of Chinese policy making, not a bug:** While China had ambitions to be a world leader in tech, it seems they have recalibrated their approach to prioritize domestic stability and preservation of governance.
- **Panic buying of chip making equipment will support Q3 earnings of equipment suppliers:** Chinese imports of chip-making equipment rose from \$1.5M in April, to \$4M by September. This sudden spike will boost business for chip capex companies in the US, Japan, and the Netherlands.
- **Cloud services are an important leverage point to keep open to China:** Washington is contemplating restricting Beijing's access to cloud computing services offered by American enterprises. However, we don't expect a ban because reliance on U.S. cloud services provides the strategic option to disrupt Chinese companies' operations instantaneously. Chinese IT and AI firms that leverage U.S. cloud services using the most high-end GPUs (unavailable in China) might gain a competitive edge over their domestic counterparts. In that situation, it could be in Beijing's interests to promoting domestic cloud infrastructure and services. Relying on foreign cloud providers poses not just technological, but also strategic risks for China.

Prepared by Nick Zeniou

Enquiries:  
nick.zeniou@zenontech.co

# Arms Controls for Advanced AI Chips

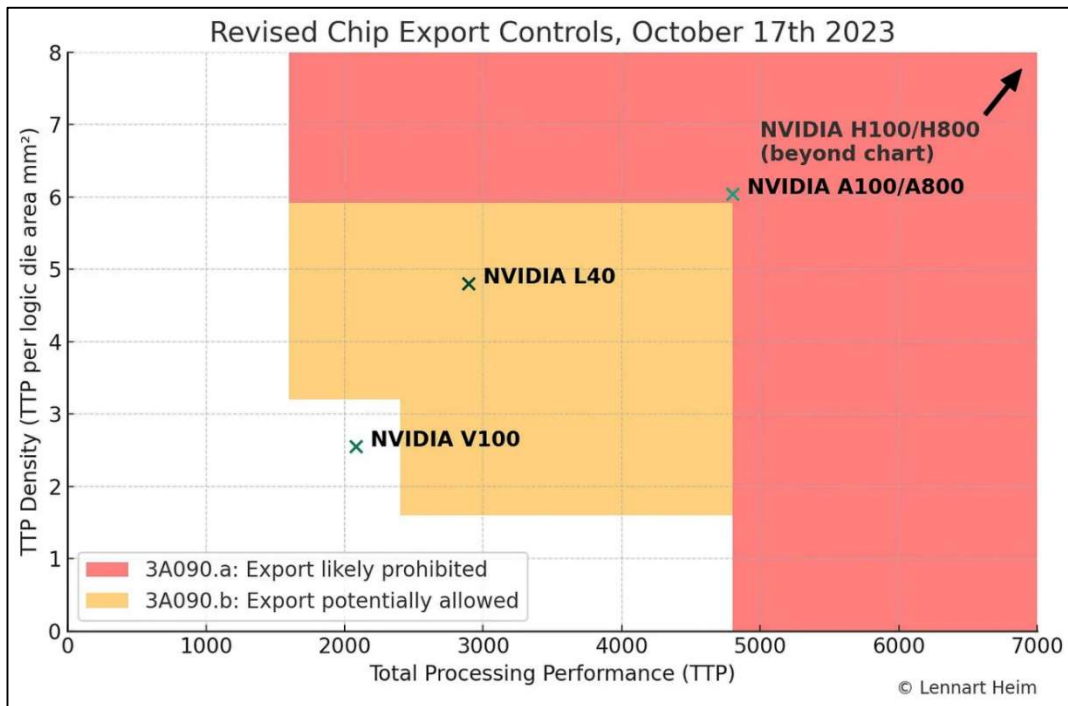
For a deeper analysis of this topic, refer to our previous post here ([Arms Controls for Advanced AI Chips](#))

The U.S. is increasingly cautious about exporting semiconductors to China, recognizing their dual-use potential in AI and military applications. In October 2022, the U.S. restricted China's access to sub-14nm equipment and chips, along with prohibiting U.S. entities from supporting semiconductor development in China. Stakeholders raised concerns about the broad scope of the restrictions, advocating for international consensus, potential harm to U.S. tech leadership, lack of allied controls, and collateral damage to global collaborations.

In October 2023, the Biden administration reinforced these controls by adding specificity to the manufacturing equipment restrictions, targeting shipments of advanced semiconductors to Chinese data centers, including countries that are under arms export controls to the AI chip ban and scrutinizing third-country shipments to China. The expansion of controls aims to prevent China from obtaining critical semiconductor manufacturing equipment and advanced ICs.

The new rules include tiered controls for advanced integrated circuits (ICs), exemptions for consumer chips, and measures to address circumvention. The new restrictions are tighter at the leading edge and prevent leakage while not expanding on lagging edge or consumer technologies. U.S. export controls aim to limit China's access to advanced technology while avoiding complete cutoff, allowing room for US suppliers in China. However, Chinese companies may still increasingly turn to domestic options for critical technology, aligning with Beijing's strategic objectives.

**Tier 1 Chips banned in 'Countries of Concern':** To prevent the PRC from acquiring advanced ICs via indirect routes or by accessing datacenters with these ICs, BIS is extending controls of Tier 1 chips to certain countries classified as D:1, D:4, and D:5. The list generally includes countries subject to arms controls: Afghanistan, Belarus, Burma, Cambodia, Central African Republic, China (PRC), Cuba, Cyprus (now exempt), Iran, Iraq etc.



# AI Technology Too Important to Lose

For a deeper analysis of this topic, refer to our previous post here ([AI Technology Too Important to Lose](#))

---

Advanced AI capabilities—facilitated by supercomputing, built on advanced semiconductors— present U.S. national security concerns because they can be used to improve the speed and accuracy of military decision making, planning, and logistics. They can also be used for cognitive electronic warfare, radar, signals intelligence, and jamming. These capabilities can also create concerns when they are used to support facial recognition surveillance systems for human rights violations and abuses. *Restrictions on Advanced Computing Semiconductors to Countries of Concern*

---

**A New Era of Warfare:** Recent events and studies show that AI's role in warfare is not just restricted to enhanced strategies or advanced tactics. It's a high leverage force multiplier. Lethal Autonomous Weapons Systems (LAWS) and Drone Swarms are prime examples of how AI fundamentally alters combat dynamics. Additionally, AI platforms provide military commanders with a [battle map graphical interface](#) (GUI) that resembles a real time strategy (RTS) GUI with innumerable data feeds and communication channels.

**However, No Single Technology is a Panacea:** The U.S. and its allies face a near-peer adversary that is not only catching up but, in some domains, outpacing them. China's trajectory in the realms of AI, quantum computing, and advanced missile systems has redrawn the strategic landscape. The challenges are twofold: not only does the West have to successfully integrate and adapt to AI warfare, but it must also anticipate and counter similar or even superior capabilities from China. While AI has the potential to revolutionize military strategy and tactics, its ubiquity and accessibility mean that dominance is no longer guaranteed by mere adoption. The key will lie in mastery, constant innovation, and the agility to deploy AI effectively in a rapidly evolving battle environment.

**AI Creates an Economic Windfall:** The transformative potential of Generative Artificial Intelligence (AI) is set to usher in an [economic paradigm shift](#). Sectors ranging from banking to retail anticipate profound shifts in productivity and revenue. The total addressable market (TAM) of AI is anchored in its automation capabilities, labour productivity growth, and its imminent role in reshaping industries globally.

Numerous research firms are eagerly dissecting the transformative effects of Artificial Intelligence (AI). Amidst the cacophony, voices like [Goldman Sachs](#) have distinguished themselves. The numbers for generative AI are nothing short of astonishing:

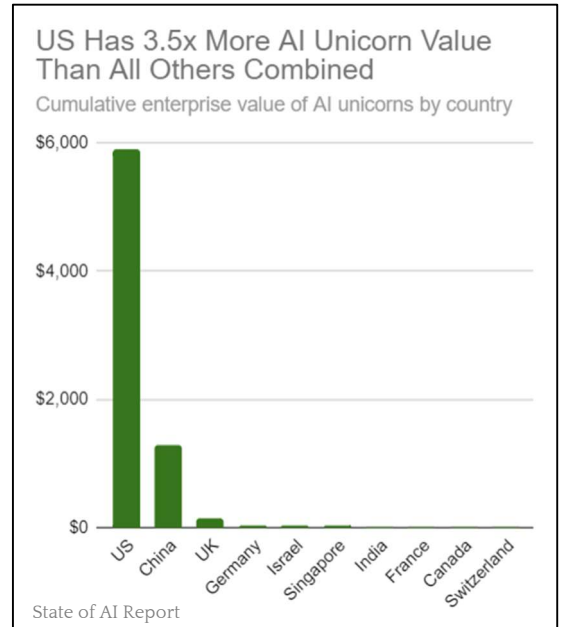
- Generative AI could raise annual **US labour productivity growth by just under 1.5% per year over a 10-year period** following widespread business adoption.
- Generative AI could eventually **increase annual global GDP by 7%**, equal to an almost \$7 trillion increase in annual global GDP over a 10-year period.
- Generative AI will be disruptive to jobs: “We find that roughly **two-thirds of current jobs are exposed to some degree of AI automation, and that generative AI could substitute up to one-fourth of current work.**”
- AI investment could approach 1% of US GDP by 2030 if it increases at the pace of software investment in the 1990s. (That said, US and global private investment in AI totalled \$53 billion and \$94 billion in 2021, a fivefold increase in real terms from five years prior.)

# Contested US Leadership: AI Matchup

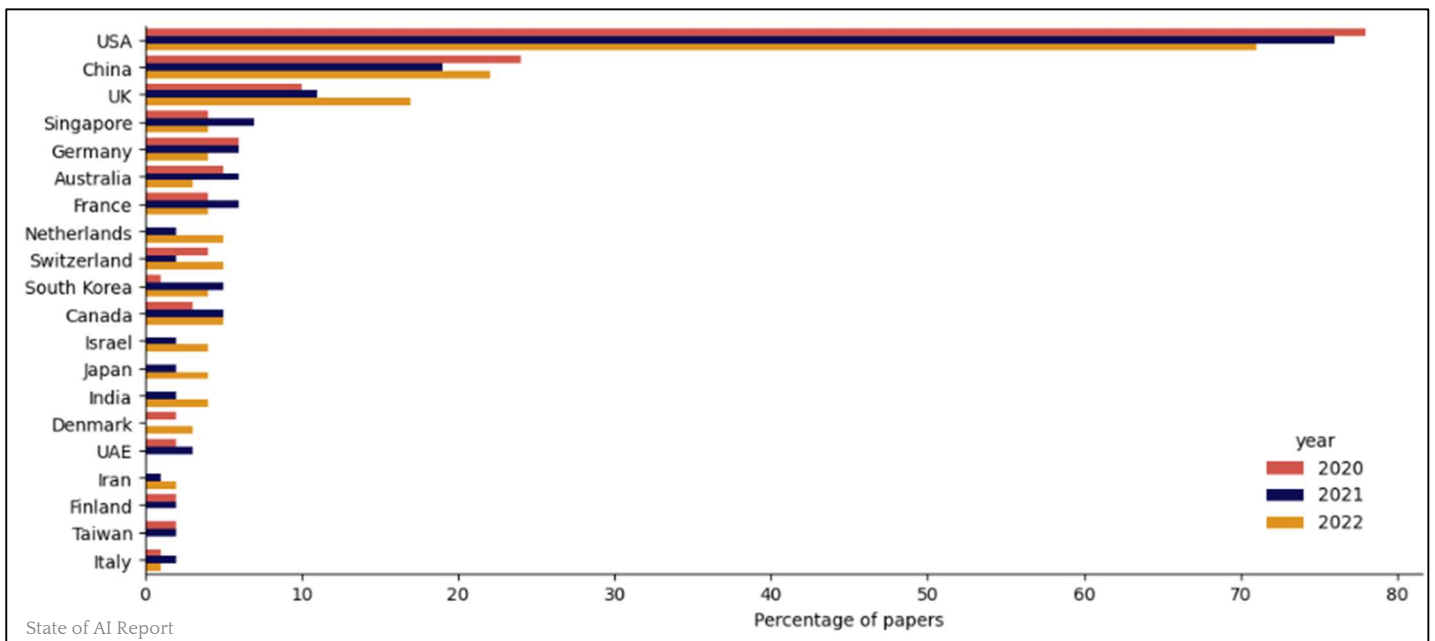
For a deeper analysis of this topic, refer to our previous post here ([AI Technology Too Important to Lose](#))

In evaluating global AI leadership, there is a quadrant of vital elements: Data, Algorithms, Hardware, and Talent. Data drives AI, and as more devices gather it, AI systems sharpen their accuracy. Algorithms transform this data into meaningful insights, while high-powered hardware ensures processing. Yet, these systems are only as potent as the human experts behind them, underscoring the competition for top AI talent. Algorithms are universal and easily replicated, so the edge often lies in proprietary data and advanced hardware. Nonetheless, the bridge between these technical facets and real-world utility is human expertise, and the institutions that channel these assets into tangible applications play a decisive role in AI leadership.

The current AI landscape presents a nuanced picture. While the **U.S. publishes around 30% more papers than China, the US published 70% of the most cited papers.** Remarkably, when considering publications in the CNKI (China National Knowledge Infrastructure, a leading Chinese academic database), **China's output is a whopping five times that of the U.S.**



However, there's a significant shift in the AI sector's dynamics. Before 2010, academic institutions spearheaded 80-100% of large-scale AI outcomes. By 2020, this plummeted to below 10%, with startups and private enterprises wielding commercially driven agendas stepping in. Analysing the startup ecosystem, the U.S. has 292 AI "unicorns" (startups valued over \$1 billion) with a cumulative worth of \$5.9 trillion. In contrast, China boasts 69 such firms, valued at \$1.3 trillion. **Thus, while China's academic contribution is vast, its commercial translation lags the U.S. ecosystem.**



# China Tech Ban Defensive Tactics

For a deeper analysis of this topic, refer to our previous post here ([China Tech Ban Defensive Tactics](#))

**NVIDIA Probably Won't be Designing Around these Sanctions:** While companies like Nvidia may contemplate introducing China-specific chip designs to maneuver around these regulations, the constraints of the performance density rule make this almost impossible. But, if there is a way, NVIDIA will find it.

**Diverse chip combinations as a solution:** Chinese companies are merging three or four older-generation chips. This approach requires AI systems, where NVIDIA has a huge multi-year lead on Chinese counterparts. However, given that NVIDIA chips possess an impressive lifespan – with a 5-year span from launch to peak popularity – Chinese enterprises maintain a good lifetime with their acquired A800 and H800 models.

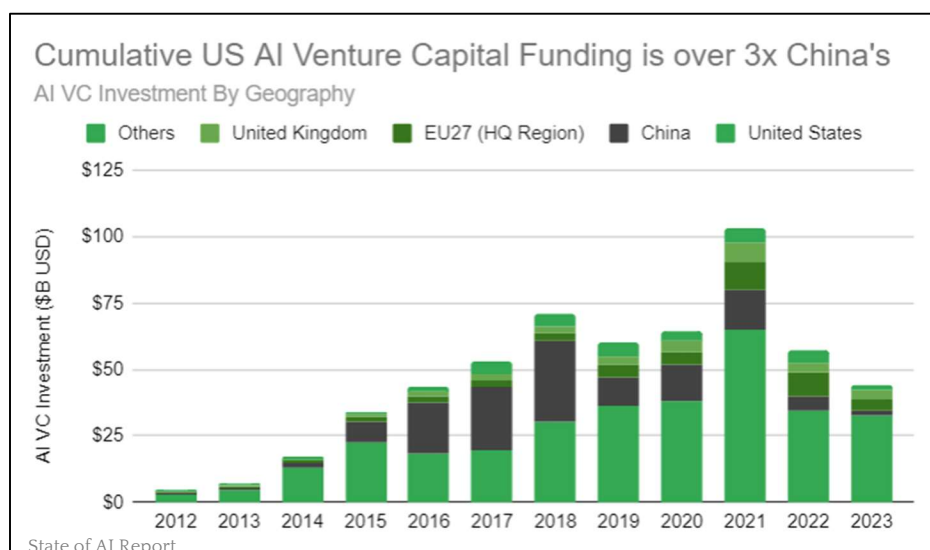
**Continued progress requires systems, algorithms, AND hardware:** Model size has increased by 17.6x each year for the last decade. Expanding AI model sizes puts extraordinary pressure on 1) AI Hardware Performance, 2) AI Model Efficiency and 3) AI Infrastructure Scaling. Losing out on any of those fronts will kill an AI company's competitive edge. For growth, software alone isn't enough.

**Chinese GPU designers will turn to local fabs:** In the immediate future, Huawei appears to be the front-runner for local chip designs. Huawei has successfully produced a 7nm ASIC using SMIC. The 2019 Ascend 910 from Huawei already surpasses existing regulations, implying that a homegrown successor would likely outpace anything Nvidia is permitted to deliver to China.

**Chinese Hyperscalers can access chips unlike start-ups:** Well-established corporations like Alibaba or Tencent have the financial muscle and strategic agility to navigate these challenges. The scarcity of GPUs benefits the major cloud players on a relative basis while posing challenges for smaller firms who lack the scale and inventory to access hardware.

**National priorities and lack of hardware will thin out Chinese AI:** As the nation grapples with limited AI chip resources, priority will undoubtedly be given to projects of national significance. Those deemed non-essential might find themselves sidelined or abandoned altogether. This stringent resource allocation, encompassing both financial investments and compute power, underscores the necessity for China to adopt an extremely lean approach to resource management.

**Chinese AI startups face a glaring capital crunch:** Instead of fueling AI innovations, the bulk of China's tech risk capital is channeled into chip development, leaving the AI sector to be largely dominated by hyperscalers. This landscape presents an almost absurd risk for venture capitalists since up to [80% of funds raised by AI startups](#) can be consumed by purchasing compute resources.





# Independence, not Insanity: China Tech Strategy

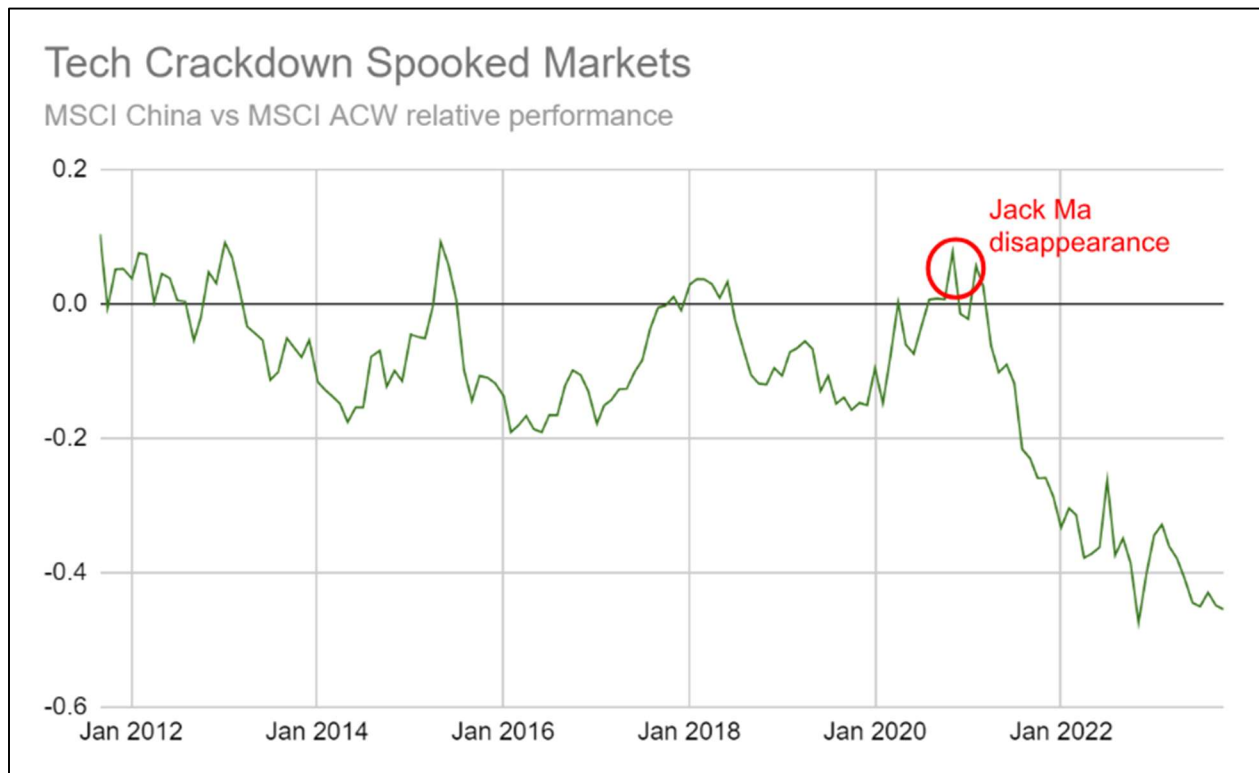
The Made in China plan, MIC 2025 aimed to transform China into a major technological powerhouse, but its execution revealed certain strategic oversights, particularly failing to predict the backlash from foreign nations. While the plan remains operative, the emphasis within China's tech industry seems to have pivoted from wild growth and global dominance to self-sufficiency and consolidation.

While the US observes, orientates, decides and acts in response to developing events in order to meet technological development objectives, China's activities seem to have led to several strategic missteps from the American viewpoint. Observing these actions, Westerners might conclude that the Chinese leadership is either unaware of the repercussions of their decisions or they're simply indifferent. However some of their actions make sense within their strategic context.

*Given a series of several foolish actions, it is hard not to think that Chinese leadership is clueless about the implications of its behavior.* [Jeffrey W. Hornung, Senior Political Scientist, RAND](#)

This difference in strategies hints at deeper cultural and historical priorities. Historically, China's focus in technology wasn't purely about achieving global supremacy but also maintaining its cultural identity and coherence. On the other hand, the U.S. tech policy embodies its longstanding cultural values of dynamism, adaptability, and striving for primacy. In essence, while China had ambitions to be a world leader in tech, it seems they have recalibrated their approach to prioritize domestic stability and preservation of culture.

**“I think among the richest men in China, few have good endings.”** Jack Ma



*Looking back to the Chinese government's tech crackdown that began in 2020 ([Zen on Tech V14](#)).  
Credit for concept of this graph goes to BCA Geopolitical Strategy team.*

## | Case Study: China's Haijin (Sea Ban) Policy

Haijin, or "sea ban", was a maritime policy implemented at various periods in Chinese history. Its primary intent was not a blanket prohibition on all sea trade, but rather to restrict private maritime trade. This allowed the government to centralize and control commerce.

**Divergent Interests of Northern Plains, Southern Coasts:** The geography of southeast China, spanning from Zhejiang to Guangdong, is marked by mountainous terrain and coastal enclaves, making it conducive for maritime activities. These physical conditions promoted trade out of necessity, as agrarian self-sufficiency was challenging. In different historical circumstances, these regions could have potentially developed into maritime-focused city-states, akin to those in ancient Greece or Phoenicia. However, the prevailing Chinese civilization that emerged from the North China plain was predominantly agrarian and became the dominant force in the region. This civilization's strength was rooted in its early establishment of a state structure and the vast expanse of the plain, supporting large populations. Consequently, southeast China was incorporated into Chinese empires before any distinct native maritime civilization could mature. Despite the empire's agrarian foundation, with a significant portion of its population being peasants, the natural conditions of the southeast coast meant that its inhabitants needed maritime activities to survive.

**Why Implement a Policy that Limits Prosperity?** The implementation of banning private sea trade, Haijin, was multifaceted. Beyond the economic benefits of trade centralization, a critical driver was the pursuit of stability. Given China's vast size and regional diversity, an agrarian-focused economy fostered a sense of equilibrium and continuity. Free trade, conversely, could introduce economic volatilities, heighten regional disparities, and undermine centralized governance, potentially leading to fragmentation. The maritime restrictions, or Haijin, established by ancient Chinese empires like the Ming Dynasty, stemmed from a preference for agrarian economies, a need for centralized control, security concerns, and the desire for economic stability and increased revenues. These bans aimed to protect and uphold a largely farming-based economy and prevent unregulated private sea trade that could diminish the central government's control. However, when these bans were enforced, coastal populations, reliant on maritime trade, often resorted to illicit activities, such as smuggling. This led to unintended consequences, including piracy, and raiding.

**The Fallout of a Struggling Empire** The late Ming dynasty serves as an illustrative case. In 1567, the sea ban was relaxed, resulting in an increase in overseas trade and an influx of silver, enriching the southeast. Yet, by the early 1600s, external factors caused a significant reduction in silver imports, leading to economic strains. Concurrently, challenges arose on multiple fronts: Manchu assertiveness in the northeast, a series of rebellions in the southwest and northwest, piracy along the southeast coast, and confrontations with emerging Western powers. These pressures necessitated increased taxation, exacerbating domestic unrest. By 1633, the situation escalated into widespread rebellions, contributing to the Ming dynasty's collapse.

---

"Authoritarian regimes undermine themselves. And so, your job with authoritarian regimes is not to have the world go up in smoke in the meantime while they're doing the work. So, China's Xi Jinping has a gun to China's head, and he's had it there for a while now. The Hawks, what do they want to do? They want to rush in and help him pull the trigger. And the doves, known as the treasury, what do they want to do? They want to run in and take that gun away because God forbid we would decouple. What do I want to do? I want to say, 'Oh, you got a gun to your head? I'm going to watch what you do with that gun as long as you don't point that gun at me.'" [Understanding the New World \(Dis\)Order, with Stephen Kotkin](#)

---

## | Hugging Face's Blockade: Bad for AI, Good for Beijing?

[ChinaTalk Hugging Face Blocked! "Self-Castrating" China's ML Development](#)

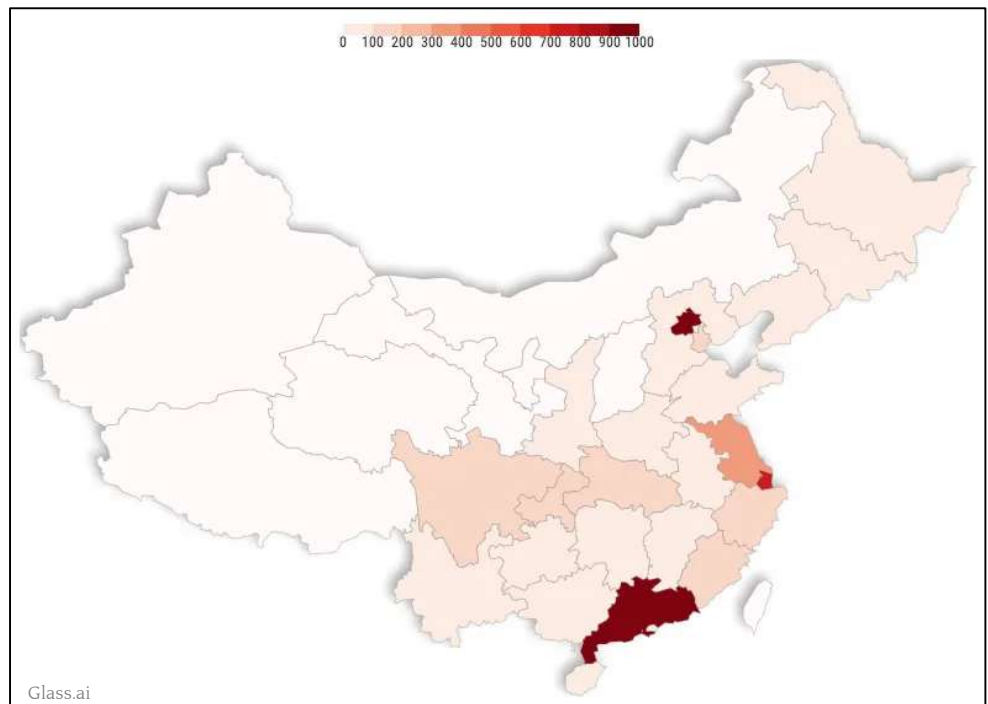
China's recent restriction on access to Hugging Face, an essential platform for the AI community, suggests an increasing clampdown on open-source platforms. While platforms like GitHub have experienced challenges in China, their intrinsic value to the tech community has so far forestalled long-term bans. Hugging Face's ordeal suggests Beijing's growing assertiveness in cultivating domestic tech infrastructure, perhaps with an intent to reduce reliance on international entities. The *Haijin* policy offers an interesting historical parallel. The lack of maritime activity eroded China's global standing, and over time, while Europe's seafaring nations expanded their horizons, China's influence receded.

Hugging Face, the now 7-year old company that has firmly become the town hall for open source AI, is seeing significant momentum as the community vies to keep AI models and datasets accessible to all. Over 1,300 models have been submitted to their Open LLM Leaderboard in a few months and >600 million model downloads in August 2023 alone. These models are exposed on Spaces as web applications built with tools such as Gradio or Streamlit, enabling broader accessibility and rapid prototyping. Monthly active Gradio users has grown 5x from 120k (Jan '23) to 580k (Aug '23).

There's a potential lesson in the *Haijin* for modern China, with over 60% of the Chinese AI industry in Southern Coastal Cities: overemphasis on control can have unintended repercussions. While China's modern policy aims to fortify its tech prowess, the country runs the risk of stifling innovation by limiting access to international platforms that, like Hugging Face, play an integral role in global AI advancements. Local alternatives, while promising, have yet to reach the robustness and versatility of their international counterparts.

In essence, the balancing act between stringent control and fostering innovation is precarious. By tilting heavily toward the former, China could inadvertently echo its historical *Haijin*, a policy that isolated it from global advancements. As the global AI race heats up, the stakes are high, and only time will tell if China's tech policy propels it to independence or inadvertently stymies its progress.

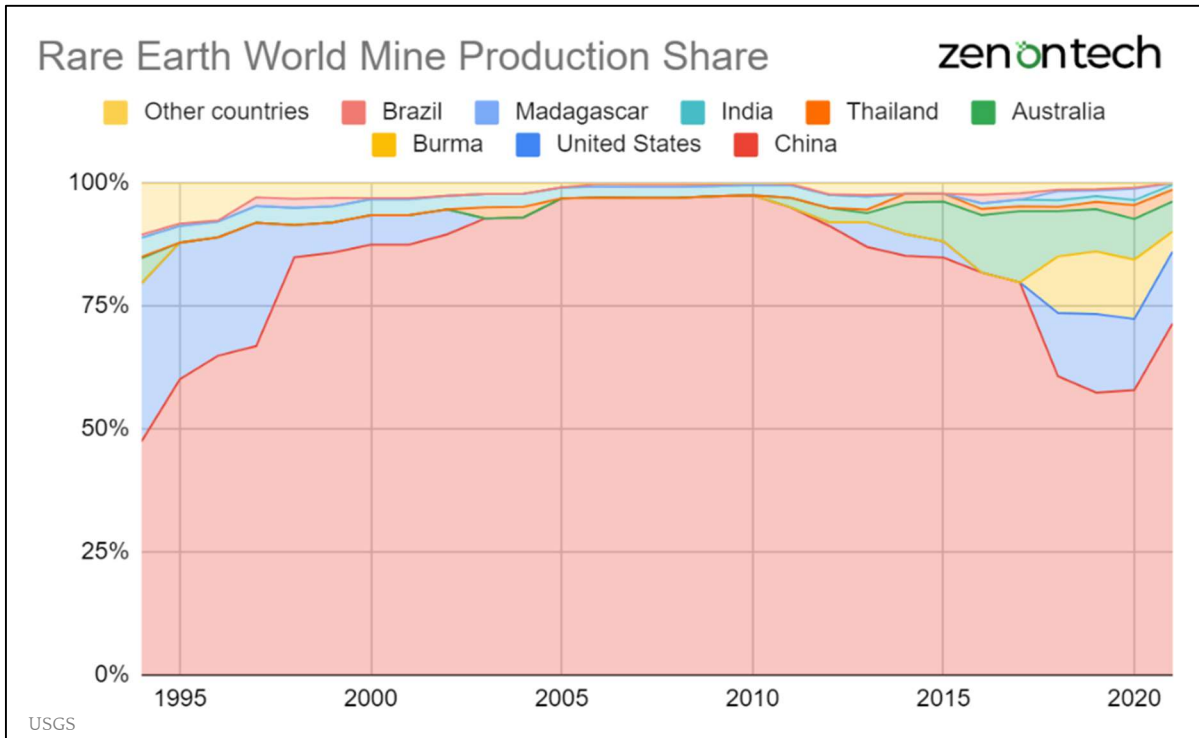
Over 60% of China's AI industry is in Southern Coastal Cities





## Chinese Blockade of Minerals could only be for the Domestic Audience

Recently, the PRC's Ministry of Commerce and the General Administration of Customs [announced a new export control](#) measure on graphite, reminiscent of their earlier restrictions on gallium and germanium. While China's dominance in this sector is a result of incentivizing local companies to overproduce, leading to suppressed global prices, such strategies present vulnerabilities. **When export restrictions are placed on commodities that aren't particularly rare or complex to produce, it opens opportunities for other global producers to fill the market gap.**



### [Graphite stocks surge as Beijing opens new frontier in trade war](#)

Andy Leyland, CEO of Supply Chain Insights, [commented on the recent restrictions](#), "Graphite markets have been in oversupply, with falling prices, so the export licences don't make sense from a market standpoint. They will worry the West, however, and be a boon to up-and-coming producers outside China." Ultimately, while the PRC's export controls may serve a domestic political narrative of strength, in practical terms, are strategically counterproductive. **A host of other suppliers are poised to replace Chinese suppliers, demonstrating fundamental principles of business economics.** This dynamic is demonstrated in Syrah Resources' share price, up 66% since the ban after being on a persistent downward slide.

But as the global high-tech industry chain has already been disrupted by the hegemonic behavior of some countries, it would be delusional to expect China to sit idle. When the interests of China's industry chains are hurt, why shouldn't China take necessary measures to protect its legitimate rights and interests? [Global Times](#)

## Size Matters: Technological Leverage in Conflict

In assessing the trajectories of the U.S. and China within the realm of AI and technology, several compelling narratives emerge. At present, given the framework of restrictions, the U.S. holds an edge in the AI competition. This advantage stems from the nation's hardware advantages and efficient allocation of resources, fostering a dynamic ecosystem conducive to technological innovation and entrepreneurship.

Chinese start-ups have struggled to access chips amid US sanctions which has left them scrambling for a foothold. The big players in China, the 'hyperscalers', have managed through sanctions, however they have failed to amass the vast computational power of their American counterparts. China's strength lies in its scale, centralization, and commitment to promoting indigenous technology. While Chinese AI start-ups may struggle, Beijing can still mobilize the rapid deployment of resources on projects of national significance.

Drawing lessons from history, the 1970s—despite its economic challenges—saw the U.S. birth tech titans like Microsoft, Apple, and Intel (1968). These entities later provided the West with an unforeseen strategic advantage against the Soviet Union during the Cold War. Two factors, however, make this competition uniquely intense. Firstly, China's economy is large, having surpassed the U.S. in terms of purchasing power parity and inching closer on a current dollar basis. This economic might affords China a clout the Soviets never enjoyed. Secondly, China's unique blend of state-driven centralization and private sector creates an environment capable of innovation. This duality poses a significant challenge, as China's private sector is dynamic enough to potentially rival the innovative spirit of the West.

The U.S.' strategic deterrence in the ongoing AI and tech competition with China hinges on preventing China's dominance in key tech sectors and reducing reliance on it for essential commodities, while concurrently imposing systemic costs on China's tech development. Through sanctions against companies like Huawei, the U.S. hampers individual entities but also signals to the broader Chinese tech landscape its readiness to thwart significant technological leadership bids. Each time the U.S. increases sanctions on China, Beijing responds with more state support. This approach drains China's resources, forcing them into defensive technological investments. Conversely, while the U.S. struggles toward stability in tech supply chains, it has intensified efforts in cutting-edge technologies and global partnerships to consolidate its technological leadership. This duality seeks to balance immediate security with sustained innovation.

In sum, while the U.S. benefits from an efficient, entrepreneurial ecosystem, China's massive scale and fusion of state and private sectors present a formidable counter. China is large and innovative enough to have market leading positions in some technology verticals. The U.S. is better situated to innovate and breach the new frontiers of compute and AI while Chinese resources are funneled into catching up. However, when new approaches or applications emerge in areas where China is not proficient, Beijing has the resources and coordination to replicate or mitigate foreign advances domestically.

---

This is a marathon, not a sprint.

---

## | Fragile Strategies of Precision Targeting

In the current era of rapid technological advancement and global power shifts, the US's grand strategy must be sophisticated, nimble, and assertive. Beijing's technological rise poses multifaceted challenges to the US, from potential military advantages now to the battle for global economic dominance in the long run.

### Case Study: U.S. Attempt to Precision Bomb German Ball Bearings Factories

During World War II, the Allies engaged in strategic bombing to cripple the German war machine. A significant debate arose over the strategy. Ball bearings, being crucial components in almost every piece of military machinery, became a focal point. The UK's Bomber Command, under Air Marshal Arthur Harris, was wary of the idea of "panacea" targets, like the ball bearing factories in Schweinfurt. Harris was skeptical of the disproportionate emphasis on these factories, suggesting that some experts had "gone completely mad" over the ball bearings. He was a strong advocate for area bombing, aiming to weaken German civilian morale and hamper war production at a macro level. In contrast, the U.S. Eighth Air Force was a staunch believer in precision bombing. They believed that accurately targeting and decimating Germany's critical industries, including ball bearing factories, would be more effective in hindering the German war effort.

**Execution:** The U.S., with its capability to conduct precision daylight bombing, targeted facilities such as the Schweinfurt ball bearings factories. The bombing raids, especially in 1943, were intense, with the U.S. aiming to systematically reduce Germany's ball bearing production. Precision bombing was a difficult task during World War II.

While the U.S. had advanced Norden bombsights that theoretically allowed for accurate bombing, several factors compromised these missions: **Heavy Defenses:** German air defenses were robust, leading to significant bomber losses during raids. **Technical Limitations:** The accuracy of daylight bombing was still relatively low, leading to many missed targets. **Weather and Visibility:** Bombing runs were often hampered by poor weather and visibility conditions.

**German Response:** The Germans showcased adaptability and resilience in response to the bombing raids:

- **Redistribution:** They dispersed their production capabilities, moving essential parts of their ball bearing manufacturing to smaller facilities and even underground.
- **Increased Production:** Despite the bombing, Germany increased its ball bearing production by optimizing other factories and relying on alternative sources.
- **Stockpiles:** The Germans had significant stockpiles of ball bearings, which allowed them to continue operations even as factories were bombed.
- **Imports:** Beyond self-production, Germany started heavily importing ball bearings from neutral countries, notably Sweden and Switzerland, to supplement their needs.
- **Alternative Solutions:** Slide bearings were substituted in many cases, allowing the Germans to bypass the need for ball bearings in certain applications.

**The Strategic Implication:** The campaign against the ball bearing factories illustrates the inherent challenge in targeting a single, albeit critical, node of an adversary's war apparatus. Even if the node is damaged or destroyed, a broad, adaptable platform – in this case, the entirety of the German war industry – can find ways to mitigate the impact. Attacks on narrow strategic targets can often be countered by broad, adaptive platforms. The German ability to adapt, utilize stockpiles, rely on imports, and find alternative solutions showcases the challenges in relying solely on precision strikes to cripple an enemy's capability. The war was not won, until Germany's ability and will to fight was eliminated. This lesson remains crucial today, reminding modern strategists of the multifaceted adaptability potential adversaries may exhibit.

## | Size Matters

The strategic lessons drawn from the U.S. precision bombing attempts on German ball bearing factories during World War II provide striking parallels to the modern geo-economic strategies, notably the U.S.' approach to sanctioning Chinese companies. At the heart of this parallel: "**Size matters.**"

Despite precision bombing attempts, Germany's resilience and adaptability ensured continued production and operation. This resilience wasn't merely a result of the physical distribution of their factories, but the depth and breadth of their entire wartime industrial ecosystem. From the deployment of stockpiles and the initiation of imports from neutral nations to the innovative use of alternative solutions like slide bearings, Germany's ability to adapt showcased the challenges in relying solely on precision strikes to cripple an enemy's capability.

Fast forward to the modern era, the U.S.'s sanction strategy towards Chinese companies bears semblance to the precision bombing approach. Smaller companies like ZTE, when faced with U.S. sanctions, found themselves on the brink of disaster, much like a singular node of Germany's war machine that could be more easily disrupted. However, the more extensive, diversified behemoth Huawei, displayed resilience reminiscent of the broader German war industry. Huawei's vast global operations, deep supply chains, and strong domestic support allowed it to weather the sanctions storm, much like how Germany's broader infrastructure and adaptability allowed it to navigate the challenges of the bombing raids.

The implication is clear: targeting a specific entity, whether a ball bearing factory or a tech giant, may not produce the desired strategic outcome if that entity is part of a larger, resilient, and adaptable ecosystem. Precision strategies, while potent against smaller targets, might prove less effective against larger ones equipped with broader resources and capacities for adaptation.

In essence, both historical and contemporary events highlight the nuanced challenge of strategizing against substantial adversaries. Precision attacks, whether bombings or sanctions, need to be complemented by a broader understanding of the target's adaptability and resilience. Otherwise, like the Germans in World War II or Huawei today, these entities might just "muddle through," rendering the precision strategy less effective than envisioned.

## Other Considerations

Targeting choke points, especially in supply chains, has long been a strategy in warfare and economic sanctions. Choke points are specific junctures or areas that can be exploited to control or disrupt the flow of goods, services, or information, effectively "choking" an adversary's ability to function. The analysis of the time effects of such targeting strategies, taking into consideration the variable nature of stockpilable versus non-stockpilable materials, offers valuable insights:

- **Immediate Impact vs. Long-Term Depletion:** When choke points are targeted, the immediate disruption is usually evident, but the long-term effects differ based on the material. Stockpilable goods, like certain raw materials or non-perishable products, may allow for a buffer period during which the entity (be it a nation or a company) can draw upon reserves. In contrast, non-stockpilable goods, such as perishables or goods that degrade quickly, have more immediate consequences when disrupted.
- **Capital Equipment vs. Consumables:** The calculus for targeting capital equipment versus consumables changes based on their nature. Capital equipment, such as machinery or infrastructure, often has long-term utility. Damaging or controlling these can have lasting effects, as replacements or repairs are time-consuming and costly. Consumables, on the other hand, like fuel or certain raw materials, are used up in processes. Targeting their supply not only disrupts immediate operations but can also lead to long-term economic impacts if not quickly restored.
- **Psychological and Strategic Impact:** Beyond the material impact, targeting choke points also has a psychological and strategic dimension. For instance, if a nation knows its adversary has only a limited stockpile of a critical resource, then targeting that resource's supply could create panic, desperation, and strategic blunders, even before the actual physical depletion of that resource.
- **Adaptability and Innovation:** However, it's essential to note that persistent targeting can sometimes lead to unintended consequences. Just as Germany found alternatives for ball bearings during WWII, nations or entities might seek and develop alternative resources or technologies when faced with consistent choke point targeting. Japan's efforts to synthesize oil from coal during WWII is an example, though it was insufficient to meet their demands.

**Japan's WWII Oil Scenario:** During World War II, the Allied strategy to target Japan's oil supplies serves as a prime example. Japan lacked significant domestic oil reserves and thus heavily relied on imports. The U.S. naval blockade and the targeting of shipping routes that served as choke points for Japanese oil imports resulted in acute shortages. Japan had some stockpiles, but oil, being a consumable, eventually ran out, severely impacting Japan's military operations. This starkly highlights the vulnerabilities associated with non-stockpilable or consumable essentials.

In conclusion, the targeting of choke points, especially in supply chains, can be a potent strategy, but its efficacy varies based on the nature of the goods (stockpilable vs. non-stockpilable) and the broader strategic context. Understanding these nuances is essential for both the entity employing the choke point strategy and the one defending against it.



## 'Mow the Grass' Strategy: Leveraging Tech

Taking cues from history can offer insight into contemporary geopolitical strategies. The Israeli tactic against Hamas in Gaza, often referred to as the "*mow the grass*" strategy, is an approach where they never sought a complete victory. Instead, they aimed for periodic interventions to keep the situation manageable rather than trying to resolve it permanently. This idea of maintaining a balance, rather than seeking a conclusive resolution, can be seen mirrored in America's recent approach to China's tech industry.

---

Most broadly, though, this is a story of deterrence. Israel never strived for a decisive victory in Gaza. While it could militarily defeat Hamas, Israel could not overthrow Hamas without risking the possibility that a more radical organization would govern Gaza. Nor did Israel want to be responsible for governing Gaza in a postconflict power vacuum. As such, Israel's grand strategy became "mowing the grass"—accepting its inability to permanently solve the problem and instead repeatedly targeting leadership of Palestinian militant organizations to keep violence manageable. [Rand, Lessons from Israel's Wars in Gaza](#)

---

America's actions, such as the banning of specific Chinese tech firms, imposing trade tariffs, and putting restrictions on investments, can be seen as the **tech version of "mowing the grass"**. Rather than completely isolating or decoupling from China's tech ecosystem, the U.S. aims to periodically curtail China's tech ambitions, ensuring that they don't gain an unmanageable advantage. This method also prevents the possibility of an outright tech cold war, a situation neither country (nor the world at large) would benefit from. However, this tactic can have multifaceted implications:

- **Stoking Nationalism:** By periodically targeting China's tech sector, the U.S. might inadvertently stoke nationalism and resentment within China. A feeling of being "targeted" can rally citizens behind their tech firms and government, furthering the drive to be self-reliant and competitive.
- **Innovation Boost:** Challenges often breed innovation. Regular checks by the U.S. could push China to invest more in R&D, aiming to surpass their competitors and eliminate dependencies on American tech.
- **Global Tech Fragmentation:** This strategy can lead to the creation of distinct tech ecosystems. For instance, if Chinese tech giants are continuously targeted, they might create their alternatives to existing global standards, leading to a split in global tech protocols.
- **Potential Retaliation:** China, with its growing tech prowess, might retaliate with its countermeasures, targeting American tech firms operating in China or collaborating with Chinese firms.
- **Encouraging Alliances:** China might foster stronger tech alliances with other nations, potentially creating tech blocs that challenge the U.S.'s tech dominance.

While the "*mow the grass*" strategy might offer short-term gains by keeping the opponent in check, it's a high-stakes game that requires meticulous calibration. Missteps can accelerate the very rise the strategy aims to manage, creating a more determined adversary in the long run. Drawing parallels with historical precedents, one wonders whether the U.S.'s "mow the grass" strategy with China's tech industry will resemble the constrained and reactive scenario of Hamas in Gaza or will it evoke the adaptability and resilience of Germany's industrial base in response to the ball bearing bombardment. **Current trends suggest the latter, indicating that China's tech industry may showcase a robust and adaptive response like Germany's historical adaptability. However, pressure on a range of fronts will force Beijing to adopt an extremely lean approach to resource management with less and less options for technological progress.**

## | Constraining Strategic Options

While the aforementioned challenges suggest that the U.S.'s approach might have unintended consequences, there are compelling arguments that the strategy is showing signs of effectiveness in constraining China's tech trajectory.

This strategy constrains Beijing's strategic maneuverability at least in the near term while the domestic tech industry replaces foreign suppliers (*5-10 years or more for full replacement, previously discussed [China's Options for Semiconductor Security](#)*). By doing so, the US can achieve dual objectives. Firstly, it can minimize the risks of China gaining a quick military advantage through AI that might disturb regional or global stability. Secondly, and perhaps more crucially, it can ensure the US maintains its economic advantage in the long term.

### **Pushing China's Tech onto the Defensive**

While the current US strategy will stoke the creation of and innovation within a Chinese ecosystem. The US's approach is putting China's tech giants and policy makers on the defensive. This includes:

- Encouraging China to make defensive investments that address its current technology deficiencies. Such investments often have diminishing returns and can divert attention and resources from more groundbreaking initiatives.
- Making aggressive US investments in frontier technologies to ensure America remains a step ahead, forcing China to play catch-up.
- Keeping the Chinese tech industry off balance by rapidly introducing innovations, setting the pace, and creating a climate of uncertainty.

# Chips Good, Tech Bad: Sector Implications

In the intricate dance of global geopolitics and technological supremacy, China seems to have taken a step towards prioritizing autonomy and independence over outright primacy. This shift, while strategic, is set against the backdrop of an evolving world order and changing market dynamics.

Historically, strategic logic would dictate the buying of superior products while investing in DIY methods for those products that can be manufactured at a standard comparable to international competitors. However, under the looming shadow of the US's containment strategy, this balance is tipping in China. Previously, decisions were primarily made based on a cost/performance balance, influenced by sales, marketing, and branding. Today, the weight of patriotism and protectionism plays an increasingly dominant role in China's market dynamics.

---

"China's semiconductor industry is facing the most significant industrial change in the history of the global semiconductor industry, and at the same time, the best period of industrial development opportunities."

[China Semiconductor Industry Association director Chen Nanxiang](#)

---

Prior to the tech bans, the market mechanisms and strategic incentives were not in place for China's chip equipment companies to lead the technology race. The landscape has dramatically changed post-bans. Suddenly, there's a palpable urgency for these companies to innovate and take the lead. But this urgency is a double-edged sword.

The scramble to fill technological voids, primarily in the chip sector, has led to an unexpected resource drain, diverting talent and focus away from AI's cutting-edge applications. This pivot towards chip technology, while necessary for the nation, comes at a tangible cost. The flow of capital, talent, and computational resources into the chip sector implies a diversion from AI research and innovation. The strategic uncertainty this creates has broader implications. It dampens the enthusiasm for tech investments, particularly in AI, an area that China was poised to lead (*See Tech Ban Defensive Tactics*).

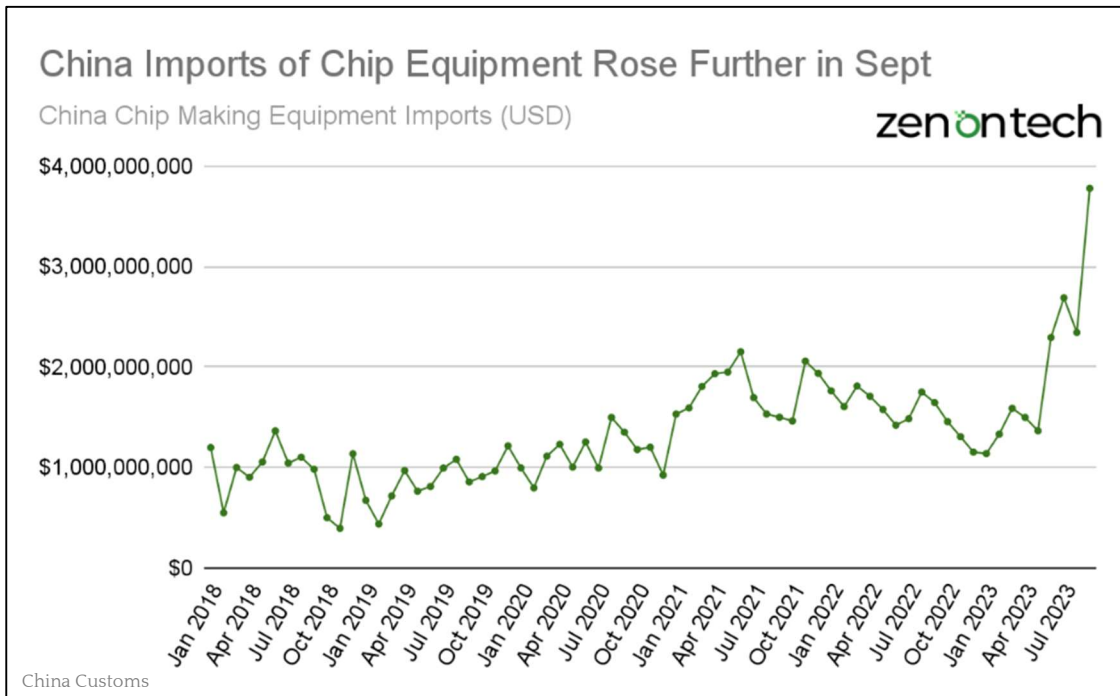
China, which once aimed for complete technological dominance, now finds itself striving to bridge existing technological gaps, and having to selectively focus on key areas. The vision of China profiting through global trade, morphed into disrupting the global order, an action that will define or potentially undermine China's 21st-century trajectory.

*Consequently, China's tech bans, while being a means to assert autonomy, raise pertinent questions about the nation's future in the tech world. Is this concentration on chip technology a mere detour, or will it prove to be a more significant impediment? Only time will tell if China's renewed focus on technological self-sufficiency will fortify its position or inadvertently hinder its progression in the global tech arena.*

## Chip Equipment: Import Surge, Be Wary of Over Production

Before recent bans, Chinese chip equipment companies had little incentive to innovate or develop cutting-edge technologies. They operated in a market that was efficiently catered to by foreign firms, with no strategic compulsion to excel in the domain. However, the imposition of bans changed this dynamic.

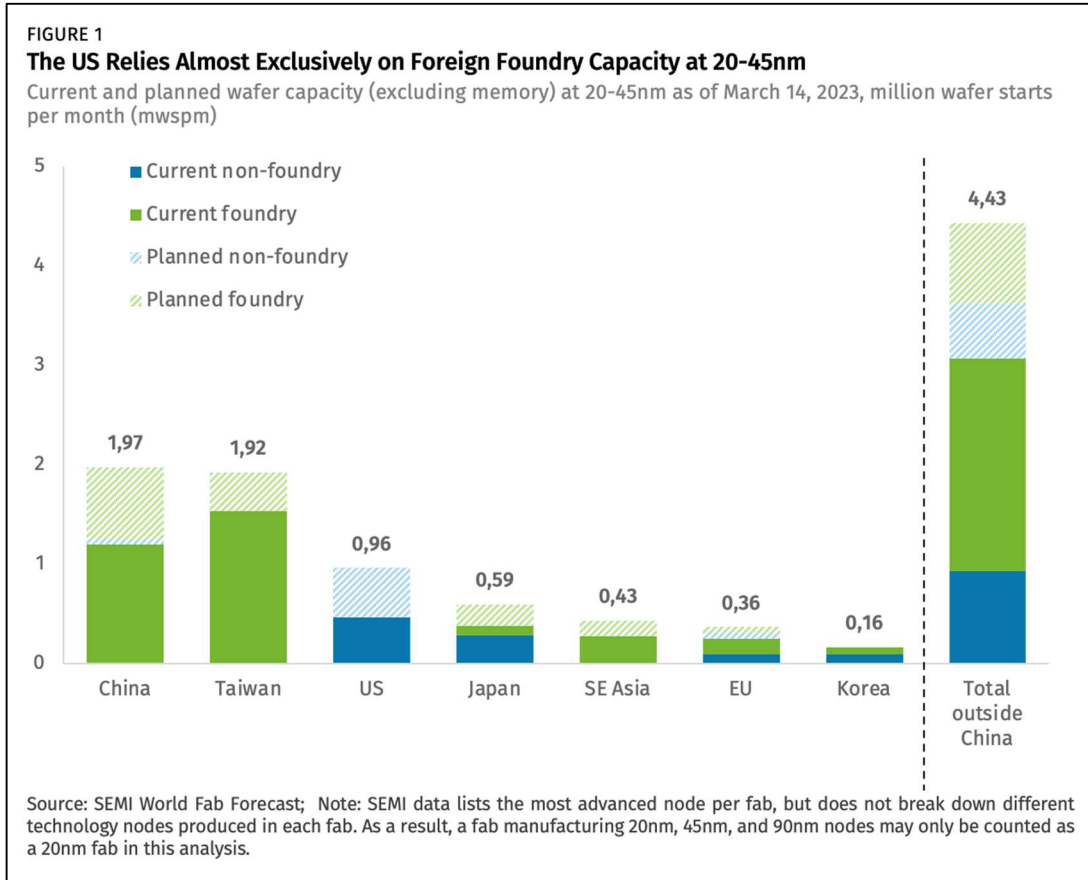
From April to September, there was a conspicuous surge in Chinese imports of chip-making equipment. From a modest figure of \$1.5M in April, imports climbed steeply to an impressive nearly \$4M by September. This sudden spike has undeniably boosted businesses in the US, Japan, and the Netherlands, where major semiconductor capital equipment manufacturers are based. Chinese fabs, eager to meet production demands, have been on a buying spree, accumulating significant volumes of foreign chip-making equipment.



Yet, this influx of foreign machinery might be a double-edged sword for China's semiconductor ambitions. While Chinese firms are stocking up on foreign tech, they could inadvertently be closing the doors on their domestic chip equipment manufacturers. The longevity of chip-making equipment, which can serve its purpose for up to 15 years, means that once a chip manufacturing facility is equipped, there is little room for replacements or additions for many years.

The ideal scenario for countries like the US would be for China to become heavily reliant on foreign chip-making technology. This would not only assure consistent demand from China for many years but would also stifle the growth of potential competitors in China's domestic market. For burgeoning Chinese equipment makers, this presents a daunting challenge. The road to matching global leaders in semiconductor machinery is already steeped in complex technical challenges. If domestic sales opportunities diminish, these firms will struggle to gather critical operational data needed to refine and optimize their machines.

*With global trends moving towards on-shoring chip production, it's plausible that in the not-so-distant future, the production of chips will exceed demand. China's massive investments in foreign equipment might allow it to exert control over legacy chip production volumes vis a vis OPEC. However, it also risks sidelining its own equipment manufacturers, depriving them of growth opportunities.*



[Running on Ice: China's Chipmakers in a Post-October 7 World | Rhodium Group](#)

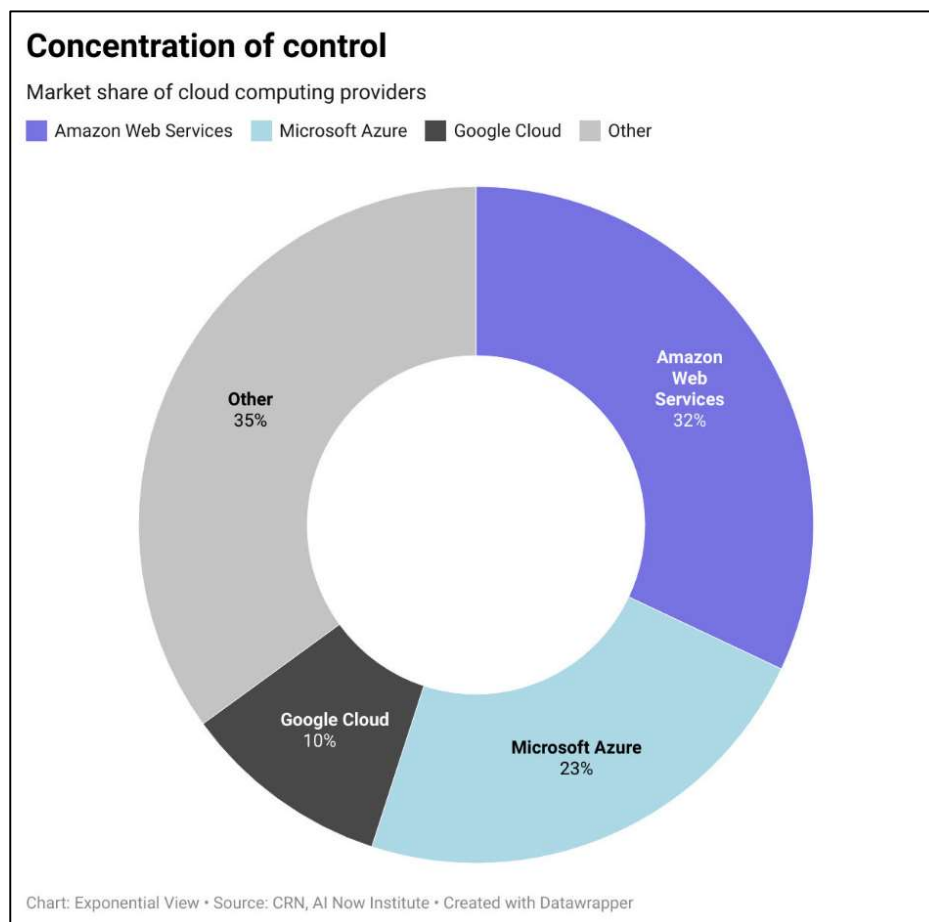


## | Cloud Services: A Double-Edged Sword

[Washington is contemplating](#) a significant move that could reshape the tech landscape. As China intensifies its drive to develop advanced artificial intelligence (AI), particularly for military applications, the U.S. is considering restricting Beijing's access to cloud computing services offered by American enterprises. Such a move signifies the broader strategy of the U.S. to curb China's tech advancements, as evidenced by the recent tightening of controls on AI-specific semiconductor exports to China. However, this potential restriction presents a multifaceted scenario.

While the initial instinct may be to block large workloads from China, reliance on U.S. cloud services could be beneficial for the U.S. The dependence provides the U.S. with the option to disrupt Chinese companies' operations instantaneously, and unlike chips, cloud workload time can't be stockpiled. In the absence of strict regulations, Chinese IT and AI firms that leverage U.S. cloud services that utilize the most high-end GPUs (not available in China) might gain a competitive edge over their domestic counterparts. If the U.S. provides forward-thinking Chinese companies with superior technology, these firms could dominate the Chinese domestic market and outcompete those that rely on dated Chinese infrastructure, reinforcing U.S. technological dominance.

A more nuanced approach to cloud regulation would involve developing sophisticated processing systems to monitor the kind of workloads being routed to cloud providers. If identified as threatening, they can then be blocked and traced. Given the circumstances, Beijing might be inclined to adopt a more self-reliant approach by promoting domestic and excluding foreign cloud infrastructure and services. Relying on foreign cloud providers poses not just technological, but also strategic risks for China.



[zenontech.co](https://zenontech.co)

*The contents of this analysis are intended to provide a general overview and are compiled with due diligence. However, Zen on Tech and its contributors cannot guarantee the accuracy, comprehensiveness, or applicability of the data and information contained herein for every individual circumstance or use. The perspectives and opinions stated in the referenced materials may not consistently align with those of Zen on Tech and its contributors. Please exercise discretion when using this information.*