Rigging the Game

How China Undermined Western Manufacturing and Helped Hollow Out American Industry

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THE SELECT COMMITTEE ON THE STRATEGIC COMPETITION BETWEEN THE UNITED STATES AND THE CHINESE COMMUNIST PARTY



EXECUTIVE SUMMARY

The Chinese Communist Party (CCP) poses a direct economic and technological threat to the United States. At the core of that threat is the CCP's quest to dominate manufacturing in critical industries. The CCP has successfully executed a decades-long campaign to achieve that domination, using an overt and familiar playbook that includes massive state investment and subsidy, the shameless violation of trading rules and norms, the deliberate and aggressive buildup of industrial overcapacity, the dumping of products to bankrupt its foreign competitors, and ultimately the consolidation of global market share and the weaponization of pricing power. American workers and innovators have paid the price.

The People's Republic of China's (PRC) industrial domination is deeply troubling and has profound strategic implications for the United States, which has quietly forfeited its leadership role in manufacturing. The damage done to the U.S. industrial base has been significant, but it is not too late to address the problem. Rebuilding and reindustrializing America is a cause that should unite all Americans, because it is essential to both the economic vitality and national security of our country.

Manufacturing capacity and the ability of a nation's military to deter and prevail in conflict are inseparable. China's campaign to dominate manufacturing has thus undermined U.S. military capabilities while building its own, illustrated by several dual-use industries that the PRC could rapidly convert to military production, all built explicitly around its "military-civil fusion" doctrine. Shipbuilding is perhaps the starkest example: China's 230-times advantage in shipbuilding capacity, built on shared resources between its commercial and military yards, allows it to outpace the United States in repairing or replacing vessels. Modern great-power conflict will be a production competition as much as a technology competition, and the side that can replace losses the fastest will more often prevail.

In most areas of manufacturing, the PRC is no longer merely competing with the United States but has decisively surpassed it. After its 2001 World Trade Organization (WTO) entry, China recognized that physical production capacity underpins 21st-century power, while the United States treated manufacturing as a legacy sector to be financialized, offshored, and replaced by services. The current trajectory favors China over the United States across most critical industries, though the outcome is not preordained.

Adequately correcting the underlying mistakes will ultimately be a generational undertaking and will require thoughtful, bold, difficult, and sustained bipartisan policy moves. But the window for meaningful action is narrowing, and inaction risks lasting harm to U.S. national security, workers, economic prosperity, and global standing. Without bold action by democratic states, we risk falling into the economic trap engineered by the CCP.

History shows we foresaw this economic trap yet policymakers forgot the lessons learned. The architects of the post-World War II trading order faced a question they never fully resolved: could you invite an autocrat to a democratic table without eventually losing control of the room? Since the creation of the General Agreement on Tariffs and Trade (GATT), the precursor to the WTO, democratic nations have grappled with whether command economies run by authoritarian governments should be allowed to benefit from the reduced tariff barriers that free nations had built for each other. One entity loomed above all others: the Soviet Union.

The United States drew a clear line. Washington opposed Soviet membership in GATT on several grounds, [1] including concerns that "'the Soviet Union does not have an economic system that presently is compatible' with the world trade body."[2] It was one of the most prescient statements in the history of American trade policy. The Soviet Union never made it to the table, only achieving "observer" status at the time of its collapse.[3] The United States had seen the threat clearly, named it plainly, and held the line.

Then, a decade later, America made a different choice when it offered a seat to Beijing.

The PRC operates a command-and-control economy mirroring the Soviet Union, but with different operational characteristics described below. The overall intended effect of Chinese industrial interventions is to reduce imports viewed as representing vulnerabilities and maximize exports viewed as boosting China's geopolitical power. PRC firms can sell at depressed prices because their losses can be absorbed by the state, enabling the CCP to dominate different industries.

The PRC has sought to indigenize sectors the party-state deems essential to its national security, as well as their accompanying supply chains, since its inception. As it has refined these efforts in the 21st century, the PRC has increasingly used its aggressive industrial policy to target "chokepoint" sectors. The PRC's chokepoint strategy operates as a sword and shield. It protects a domestic supply chain for domestic consumption, and it has increasingly been used offensively to ensure PRC global market-share dominance in those chokepoint sectors, which can then be used as leverage. This critical leverage allows the PRC government to coerce

other nations into allowing previously sacrosanct issues to be put on the bilateral negotiating table because China can wield these chokepoints to bring other economies to a halt.

The PRC's industrial policy has seen mixed success. In certain sectors, including semiconductors, biomanufacturing, and machine tools, the PRC has seen greater indigenization, output, and global market share. But in other sectors, such as aerospace, the PRC's industrial policy has thus far generated limited results at significant financial cost. Moreover, the PRC's aggressive subsidy policies have generated inefficient price competition and excess capacity, forcing PRC firms to rely more heavily on continued subsidies and to dump excess capacity on foreign markets.

This Select Committee on the Strategic Competition Between the United States and the Chinese Communist Party (Select Committee) report details how China's whole-of-society, state-directed economy enables Chinese firms to corner the global market for key industries. To illustrate this playbook, the Select Committee focused on the aerospace, semiconductors, biomanufacturing, and machine tool industries and the methods by which China's state-directed economy purposefully manipulates free markets to create dependence on the PRC supply chain.

Presently, the United States stands at a crossroads. For decades, the United States tried to nudge the PRC to respect intellectual property rights, equivalent labor standards, and market-based principles. China ignored these overtures and at times outright violated agreements. When it did comply, it selectively implemented portions of these agreements to suit its state-directed objectives. It is time to recognize that the PRC may make cosmetic adjustments, but its fundamental approach will not change, so the United States must adapt. America must chart a new course before China's state-directed industrial planning does irreversible damage to the United States economy and American workers. One analysis shows that, as Chinese exports increase, the gross domestic product of other countries, including the United States, could ***decrease*** as depicted in the below chart.[4]

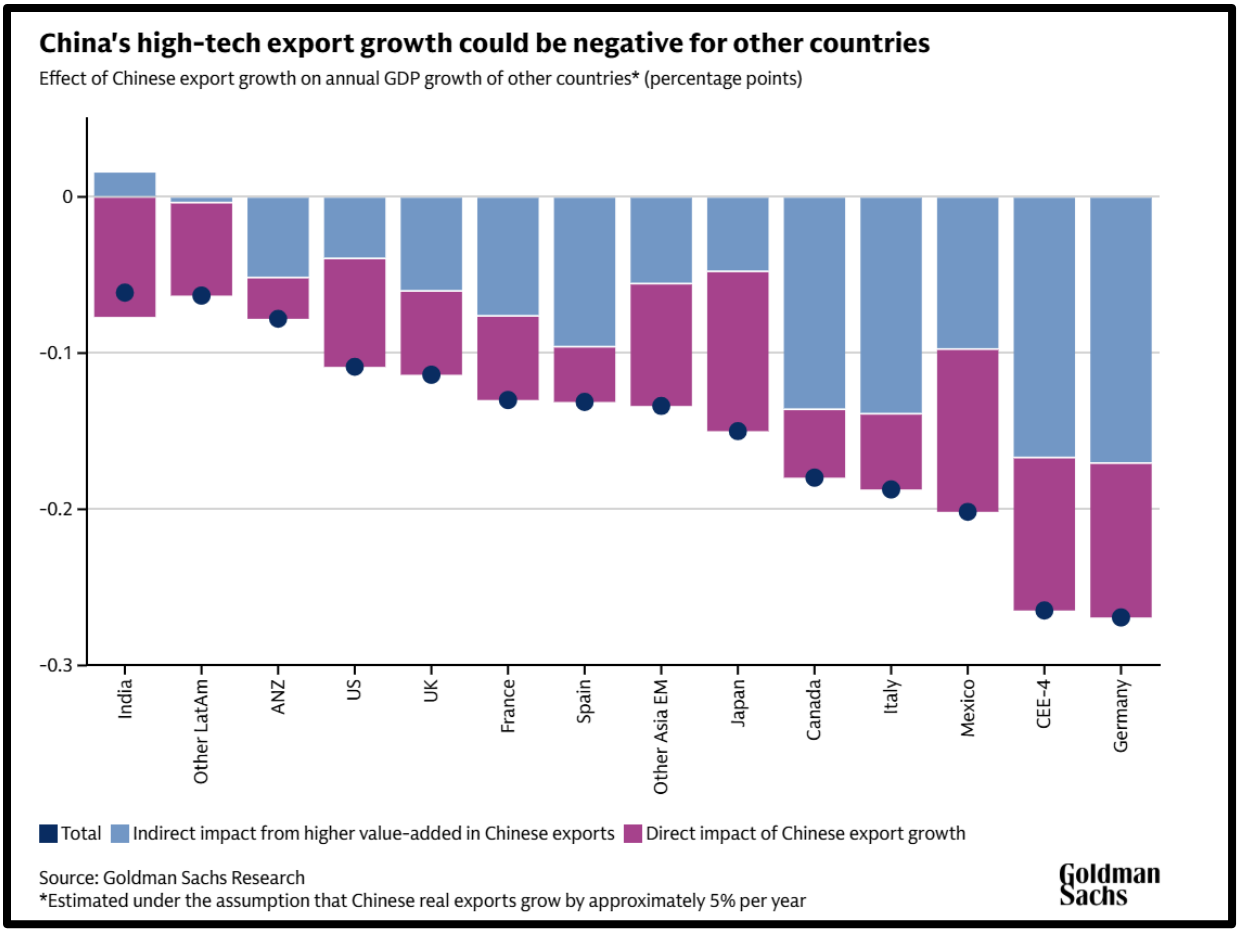


Figure 1 – Goldman Sachs Analysis Showing Growing Chinese Exports Reduces Other Countries' GDP

Now, the United States must protect our critical industries from China's state-directed economy and reshore the industries critical to American and allied power, national security, and economic vitality. Otherwise, the CCP's command-and-control economy will continue to hollow out key parts of the American manufacturing sector.

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FINDINGS

Finding 1: China has built a state-directed economic system designed to concentrate capital, resources, technology, and global market share in strategically important industries—allowing Chinese companies to compete on terms fundamentally different from those of market-based economies. Chinese government interventions have systematically targeted different sectors key to American power and national security including aerospace, semiconductors, and machine tools. As a result, American companies effectively compete against the Chinese state since many of China's large companies remain enmeshed with the PRC state apparatus.

Finding 2: China engages in a whole-of-society effort when it seeks to dominate certain important global industries, combining a series of interlocking measures to accelerate the growth of targeted industries and weaken foreign competitors. These measures include subsidies, regulatory control, coordination with State-Owned Enterprises (SOEs), and government guidance funds to facilitate investment. The overall effect of these interventions enables Chinese industry to target critical industries, sell subsidized products at artificially depressed prices to the global market, and put American firms out of business.

Finding 3: China seeks to make the world dependent on Chinese manufacturing, while it seeks to eliminate its own foreign supply chain dependencies. Through state-directed industrial planning, Beijing establishes dominance across key sectors by expanding export capacity, displacing foreign competitors, and replacing imports with domestic inputs. Consequently, Beijing's economic model generates persistent trade surpluses, limits China's reliance on overseas goods, and increases the CCP's leverage over countries dependent on Chinese supply chains.

INTRODUCTION

Central to the Select Committee's mandate is the investigation of the economic and technological threat posed to the United States by the CCP and the formulation of policy options to counter that threat.[5] At the core of that threat lies China's decades-long quest to dominate the manufacturing sector, particularly in critical industries that produce items with significant importance to U.S. national security and economic prosperity.

This report documents the CCP's nefarious playbook for dominating critical industries. The PRC's approach has been consistently effective, characterized by massive state investment and subsidy, aggressive industrial scale-up, the

deliberate buildup of overcapacity, the dumping of products to bankrupt foreign competitors, and the subsequent consolidation of global market share and weaponization of pricing power. Evidence of these predatory practices can be seen across key industries.

China's industrial trajectory, compared to the United States, is deeply troubling. Its growing domination of critical industries has profound strategic implications for U.S. interests across the immediate, medium, and long term. In recent decades, the United States quietly lost its leadership in manufacturing, and forfeiting U.S. capabilities and capacity in this area is a profound unforced strategic error. The damage that has been done to the U.S. industrial base is significant, but it is still reversible. Meaningful, thoughtful, but difficult bipartisan action will be required to address the problem. This action cannot wait.

Losing manufacturing share is usually framed as a purely economic story, but that overlooks the very real danger it poses to our communities and our national security. Manufacturing capacity and military capacity are inseparable, despite assumptions to the contrary by previous U.S. policymakers. Modern great-power deterrence is as much about production as technology. As a result, the side that can replace losses the fastest will more often prevail in any protracted fight, or most importantly, in efforts to prevent and deter a fight. For example, the drone company making commercial quadcopters is a national security asset, whether the government intended that or not. The battery gigafactory that manufactures EV cells is just one retooling away from making batteries for military drones and munitions. The shipyard that builds container ships may become the shipyard that builds destroyers if a naval shipbuilding production surge becomes necessary. The semiconductor fab that today powers consumer electronics is just as essential to producing the chips that power the tools of modern-day deterrence.

The PRC had these realities squarely in mind as it structured its industrial base, building it around the doctrine of Military-Civil Fusion. For example, it is no coincidence that the commercial dominance of its "national champion" drone company Da-Jiang Innovations (DJI) has grown in parallel with the Chinese military's drone swarm capabilities.

The PRC shipbuilding industry provides another stark example of how the CCP employs Military-Civil Fusion to the clear detriment of U.S. national security. It is no accident that China has 230 times the civilian shipbuilding capacity of the United States, due mostly to the tremendous capacity of its commercial yards.[6]



Figure 2 – Visual Depiction of U.S. Shipbuilding Capabilities as Compared to Chinese Shipbuilding Capabilities

Preserving peace must always be the priority. But, should military conflict between the United States and China regrettably occur in the future, and if it were to last more than a few weeks in duration, a shipbuilding advantage of this scale would enable China to repair damaged vessels or build replacements far faster than the United States. Consistent with China's Military-Civil Fusion principles, its commercial and military shipbuilding industries share the same welders, design talent, steel supply, drydocks, and other resources.[7] Further compounding this problem, the U.S. Navy currently carries a significant maintenance backlog and would probably be unable to quickly build or repair many warships during a great-power conflict.

In many critical industries, China isn't "competing" with the U.S. industrial base anymore; instead, China is lapping it. Most Western policy discourse underestimates the cumulative impact of China's efforts, taking a soda-straw view of each industry rather than a broad, holistic one. In the years after China was allowed to join the World Trade Organization in 2001, the CCP concluded that physical production capacity underpinned power in the 21st century. Since then, it has executed on that thesis with a discipline unmatched by any democratic state. In contrast, the United States spent the same period treating manufacturing as a legacy sector to be optimized away, allowing it to be financialized, offshored, and

replaced with services and software. Adequately correcting those mistakes will take more than a decade and will require thoughtful and forward-leaning policy moves, but that difficult work must be undertaken to defend U.S. industry and bolster our industrial base.

Fortunately, U.S. administrations from both sides of the aisle have partnered with Congress in recent years to begin revitalizing key parts of our manufacturing sector, and there are some noteworthy examples. In 2021, with strong bipartisan support, Congress authorized the Creating Helpful Incentives to Produce Semiconductors (CHIPS) for America program, incentivizing semiconductor companies to invest in domestic production facilities.[8] In 2024, Congress enacted the bipartisan Accelerating Deployment of Versatile, Advanced Nuclear for Clean Energy (ADVANCE) Act with overwhelming bipartisan support to accelerate the deployment of advanced nuclear energy in the United States and reduce regulatory barriers to rebuilding domestic energy capacity. The law modernized the Nuclear Regulatory Commission's licensing processes, strengthened the nuclear workforce, and sought to make deployment of new reactor technologies more efficient and predictable.[9]

We must also reflect on the painful consequences of American deindustrialization on communities across the country. While the PRC has used its state-backed model of industrial policy to create economic growth across China, including through the CCP's so-called "Go West" strategy to spread growth into its less developed interior provinces, American cities and towns have been hollowed out by short-sighted decisions. From the textile mills and furniture factories of the American South to the steel plants and automobile parts suppliers of the American Midwest, few corners of our country have been immune to the job losses and societal consequences of the PRC's unfair practices.

While the current trajectory favors China over the United States across most critical industries, the outcome is not preordained. The United States still has options to address the problem, but the window for meaningful action is shrinking. To date, the U.S. Government has not approached this challenge with the seriousness and urgency that it warrants. And the actions that are necessary to prevail must be much bolder than what is contemplated in current U.S. policy. Strategic steps can slow the bleeding, but they cannot rebuild capacity. If nothing is done to revitalize key U.S. industries, significant and irreversible damage will be done to U.S. national security, to our economy, and to our standing as the leading global superpower.

BACKGROUND

This section surveys the goals, processes, and mechanisms of the PRC's state-directed industrial planning. Overall, the government at the highest level chooses the individual industries that will receive significant government support, and the provincial and local level governments follow suit. The PRC's industrial planning begins with the State Council, China's highest state administrative organ, setting national priorities, then provincial and local level governments following in lockstep in those same industries. That implementation utilizes various mechanisms, including 1) subsidies of various kinds; 2) regulation; 3) guidance funds; and 4) government procurement and SOE coordination. Each mechanism complements the others, creating interwoven threads in the tapestry of PRC state-directed industrial planning.

In the 2020s, the PRC's centrally planned, command-and-control economy evolved in multiple directions. First, China's State Council called to move the Chinese economy up the value chain through initiatives such as developing "new quality productive forces."[10] It sought to indigenize entire supply chains for industries the PRC deems critical, such as aerospace.[11] And it has targeted specific industries and products that the PRC deems "chokepoints" to its national security and self-reliance.

CCP General Secretary Xi Jinping himself established the doctrine in April 2020. Speaking to the Central Financial and Economic Affairs Commission, he directed the party to "tighten the dependence of international production chains on our country, forming a powerful capacity for countermeasures and deterrence against artificial supply cutoffs by outside parties" [拉紧国际产业链对我国的依存关系，形成对外方人为断供的强有力反制和威慑能力].[12] China should also build "an autonomous, controllable, safe and reliable domestic production and supply system" in fields bearing on national security.[13] That system must be able to "self-circulate" at critical moments, so that "the economy operates normally under extreme circumstances."[14] China should also build "an autonomous, controllable, safe and reliable domestic production and supply system" in fields bearing on national security.[15] That system must be able to "self-circulate" at critical moments, so that "the economy operates normally under extreme circumstances" [在关键时刻可以做到自我循环，确保在极端情况下经济正常运转].[16]

The formulation has two halves. Abroad, China wants leverage. At home, it wants autarky. Both halves are borne out in the industries below.

History and Goals of China's Industrial Planning

The modern form of CCP industrial planning originated in the late 1970s, with the "Reform and Opening Up" [改革开放] program. The reforms did not abolish state direction of the industrial structure; instead, they subordinated central planning of prices,[17] output, and employment *within* industries to markets while retaining state authority over the allocation of resources *across* industries.[18] That sequence has three tiers: 1) upgrade traditional industries; 2) scale up emerging industries; and 3) cultivate future industries.[19]

Around 2006, Chinese industrial policy pivoted from the microeconomic liberalization that had dominated the 1990s and early 2000s back toward assertive state intervention and economic planning.[20] Provincial and local governments deployed subsidies and regulatory measures to re-shape the sectoral composition of the economy and to grow its production of higher-value goods and services. The SOE sector, whose share of industrial output had fallen sharply through the 1990s, resumed a growing role in strategic sectors, both through procurement and as the primary engine of growth in certain industries. Moreover, the party-state began to articulate ambitions to set global technical standards rather than merely absorb foreign ones.[21]

The current phase crystallized with Made in China 2025 [中国制造 2025] (MIC 2025). In 2015, the State Council announced MIC 2025. The program set the objective of transforming the PRC from a "manufacturing great power" [制造大国] into a "manufacturing strong power" [制造强国], and ultimately into a self-reliant one, with 2025 as the first waypoint.[22] Premier Li Keqiang framed the underlying problem in 2015 as one of an economy that was "big, but not strong" [大而不强].[23] Xi Jinping's report to the 19th National Congress of the CCP in October 2017 fixed the aspiration in canonical form: to "promote China's industries toward the medium-high end of the global value chain, and cultivate a number of world-class advanced manufacturing clusters" [促进我国产业迈向全球价值链中高端，培育若干世界级先进制造业集群].[24]

Made in China 2025 used a combination of legacy and novel policy tools (discussed below in greater detail). On the legacy side of the ledger, they included subsidies and regulations. And on the novel side of the ledger, they included SOE procurement, guidance catalogs, and SOE expansion in targeted sectors.



Figure 3 – Graphic of PRC Market Interventions

In the mid-2020s, the PRC tripled down on its market-interventionist industrial policy. The party-state set the objective of making the PRC a global leader in technical standards across strategic sectors. It articulated that vision in the National Standardization Development Outline [国家标准化发展纲要] issued jointly by the CCP Central Committee, the top leadership body of the CCP, and the State Council in October 2021, and operationalized in the New-Industry Standardization Pilot Program Implementation Plan (2023–2035) [新产业标准化领航工程实施方案（2023—2035 年）], issued by the PRC's Ministry of Industry and Information Technology (MIIT) and other departments in August 2023, which targets standards leadership in fields including integrated circuits, high-end machine tools, and biotechnology.[25] The PRC has increasingly sought to build self-reliance in "chokepoint" [卡脖子] sectors that produce bottleneck inputs to sectors deemed critical by the PRC. During this same time frame, PRC industrial policy has also seen greater use of export controls, expensing policies, and guidance funds.[26]

To better understand how China's state-directed policies operate, some of the different mechanisms used by the Chinese government to implement its state-directed economic priorities are laid out below, although this report will only cover part of the non-market behaviors the PRC uses to strengthen its domestic

industry. As is well understood, the PRC also uses a variety of tactics aimed at extracting innovation and capital from abroad, such as forcing foreign companies to enter joint ventures with local PRC companies, intellectual property theft, forced technology transfer, and other mechanisms. This report will focus primarily on the affirmative domestic industrial policies that China uses to shape and effectuate its manufacturing priorities.

Mechanisms

Process. The PRC adopts a top-down process to implement its industrial policy. Industrial policy begins at the State Council, which sets nationwide, multi-year targets, identifying the sector for both sectors, quality, and quantity. Sectoral targets cascade through the Five-Year Plans [五年规划], including the Outline of the 14th Five-Year Plan (2021–2025) as well as the Long-Range Objectives Through 2035.[27] Provincial and local authorities then implement those initiatives through the mechanisms detailed below. The vertical structure of the system is the source of both its[28] power and its problems: local governments and firms deploy resources to advance their own interests, producing duplicative investment and overcapacity.[29] The Chinese government calibrates its market interventions based on the PRC's level of market dominance. For example, in areas such as industrial chemicals where the PRC already leads, the government provides fewer economic incentives. For other areas such as semiconductors and aerospace, the PRC government lavishes subsidies to spur its domestic industry.

Subsidies. The PRC uses multiple forms of subsidies in its industrial policy. It directly subsidizes industry, which is often disclosed in the financial statements of listed firms. It also uses a series of indirect subsidies, including generous tax-expensing policies for research and development and below-market loans from state banks, and it deploys government guidance funds to subsidize designated sectors. The Center for Strategic and International Studies (CSIS) estimated that China spent approximately $248 billion—1.73 percent of GDP—on industrial policy in 2019, more than any comparable economy; South Korea, in second place, spent 0.67 percent of GDP, and the United States 0.39 percent.[30] On the tax side, the PRC raised the R&D expense additional deduction to 100% (meaning firms can deduct 200% of the R&D value) for eligible firms generally and an additional 120% for integrated-circuit and industrial-mother-machine firms (meaning firms can deduct 220% of the R&D value), allowing such firms to deduct 120% of qualifying R&D expenditure that is expensed, and to amortize 220% of R&D that is capitalized, from 2023 through 2027.[31] Additionally, Chinese income tax favors "high and new technology enterprises." China's statutory ordinary tax rate is 25%,[32] while "high and new technology enterprises" receive a lower rate of 15%.[33]

Regulation. The PRC party-state possesses greater regulatory capacity than most large economies. The party-state has ultimate control over land, which cannot be "owned" in the American sense but only leased for a long-term period, such as 70 years for residential purposes.[34] Those two mechanisms, in conjunction, give the PRC party-state wide latitude to implement regulatory measures: it can allocate inputs, throttle or accelerate approvals, and steer procurement toward favored firms – instruments that operate as subsidies-in-kind without appearing in any budget.[35]

Guidance Catalogs. The PRC's industrial policy relies on guidance catalogs, which designate industries and products as encouraged, restricted, or prohibited and thereby channel investment, credit, and administrative approvals. As experts have stated, the catalogs "provide a comprehensive guide to the government's industrial priorities," and the way an industry is treated in them strongly shapes that industry's access to government-controlled resources, including loans from state-owned banks and land for large projects.[36] Guidance catalogs are often enforced through the PRC party-state's control of land.

SOE Coordination. The PRC uses SOE procurement to re-structure the economy. SOEs, in particular the central ones supervised by the State-owned Assets Supervision and Administration Commission (SASAC) [国务院国有资产监督管理委员会], function as demand-pull instruments in strategic sectors. Public-sector fleet electrification for new-energy vehicles (EVs) is the paradigmatic example: the State Council's New Energy Vehicle Industry Development Plan (2021–2035) provides that, "from 2021, in national ecological-civilization pilot zones and key air-pollution-prevention regions, the proportion of new-energy vehicles among newly added or replaced public-domain vehicles, buses, taxis, logistics and delivery vehicles, and the like, shall be not less than 80%" [2021 年起，国家生态文明试验区、大气污染防治重点区域的公共领域新增或更新公交、出租、物流配送等车辆中新能源汽车比例不低于 80%].[37] By converting a mandated share of state and municipal fleets into guaranteed offtake, the party-state manufactures demand that de-risks capacity expansion by favored producers.[38]

Guidance Funds. A unique feature of the PRC's industrial policy is its use of guidance funds. Government guidance funds [政府引导基金] are state-seeded, market-structured investment vehicles: public capital anchors the fund, which is then organized as a private-equity or venture vehicle to invest in designated sectors and to "crowd in" local-government and private co-investment.[39] The flagship is the National Integrated Circuit Industry Investment Fund [国家集成电路产业投资基金] (also known as the "Big Fund" [国家大基金]). Its three phases registered RMB 98.72 billion (USD $14.78 billion) against RMB 138.7 billion (USD $20.77 billion) raised (Phase I, September 2014), RMB 204.15 billion (USD $30.57

billion) (Phase II, October 2019), and RMB 344 billion (USD $51.51 billion) (Phase III, registered May 24, 2024), with the Ministry of Finance as the single largest shareholder.[40] In January 2025, the General Office of the State Council issued Guiding Opinions on Promoting the High-Quality Development of Government Investment Funds, signaling central concern to discipline the proliferation and returns of the guidance-fund model.[41]

CASE STUDY 1: BIOMANUFACTURING

Biomanufacturing refers to the industry that seeks to harness living systems, such as plant cells or other microorganisms, as industrial factories to generate commercial products. It first appeared in the State Council's Fifteenth Five-Year plan (covering the years 2026 – 2030).[42] China recognized the significant utility associated with this new technology and engaged in a whole-of-society effort utilizing its state-directed industrial planning to rapidly develop and scale up this technology.[43] Inclusion in the Fifteenth Five-Year plan signaled top-level government intent to dominate the industry.

I. Subsidies

Beijing employed the same subsidy architecture used in other critical industries. Mirroring other manufacturing enterprises, biomanufacturing benefits from the R&D super deduction. Moreover, provinces provide significant financial subsidies for building biomanufacturing facilities. The Heilongjiang government offers a full suite of subsidies to enable biomanufacturing across the province.[44] For research and development, the Heilongjiang government contributes one-for-one for research and development costs exceeding 500,000 yuan (~$75,000 USD).[45] For scaling up manufacturing, Heilongjiang offers a subsidy of up to 10M yuan ($1.5M USD) (30% of the total investment) for pilot-scale manufacturing plants.[46] If the facility is designated by the Ministry of Industry and Information Technology as a "national biomanufacturing pilot-scale capacity building platform" [生物制造中试能力建设平台], it can be subsidized up to 50%.[47] Again, Heilongjiang is not alone. Beijing also offers a series of financial subsidies to move biomanufacturing to the area. Beijing offers to subsidize up to 30% of the fixed asset value of projects (not to exceed 50M yuan ($7.5 million)).[48] Beijing also operates a "services voucher" system that allows qualifying small and medium enterprises to access free analysis, testing, inspection, and equipment from other institutions.[49] For enterprises that receive the formal designation of a "national high-tech enterprise," the Beijing government offers a one-time payment of 100,000 yuan ($15,000) to support research and development efforts.[50]

II. Regulatory

Regulation in this sector runs on three tracks. The first is safety regulations that ensure key information for technical development remains within the country. The Regulations on the Administration of Human Genetic Resources [人类遗传资源管理条例] restrict foreign access to genetic material in the PRC. Limiting access to domestic genetic information in the PRC while simultaneously importing information from abroad provides asymmetric benefits to domestic firms.[51] The second track is the designation power itself. MIIT does not merely fund platforms – it lists them. Then it reviews them every three years and adjusts their service-capability star ratings. For example, it may strike a platform for a strain-leakage incident that causes significant economic loss. It also promises to speed project approvals through commitment-and-filing mechanisms.[52] Thus, listing is both a subsidy and a leash. The third track is export controls. The PRC government widened its list of export-controlled technology to include equipment necessary for the sector's development.

III. SOE Coordination

The SOE role in biomanufacturing differs from the SOE role in the other sectors surveyed. In aerospace and semiconductors, SOEs provide demand. Here they mostly provide capital. The clearest example is the fund-and-direct-investment model of China's State Development and Investment Corporation (SDIC). SASAC signaled that it wants more capital in the sector, and its Vice Chairman told the 2026 Zhongguancun Forum that central enterprises would build shared platforms for commercializing biotechnology results. He added that they would use their market scale and application scenarios to speed that commercialization. The 2024 future-industries opinions likewise direct a "central-enterprise future-industry launch action plan."[53] These opinions show the government agencies directing the individual ministries, state-owned enterprises, and other government actors to support this area.[54]

IV. Guidance Funds

Biomanufacturing draws on the same guidance-fund architecture described above. The seven-department Implementation Opinions on Promoting the Innovative Development of Future Industries direct governments and state capital to deploy angel, venture-guidance, and industry-guidance funds toward future industries.[55] State investors have followed. The State Development and Investment Corporation [国投集团] is a central SOE, and it reports investing more than RMB 5 billion in nearly 33 biomanufacturing companies through six market-based funds. Provincial governments have layered their own measures

on top, with Shanghai, Guangdong, and Heilongjiang each issuing dedicated support policies.[56] The pilot-scale capacity building-platform discussed above adds a further channel, instructing provincial authorities to "make good use of first-set and first-batch insurance compensation policies." It also tells them to guide financial institutions and social capital toward platform construction.[57] That instruction ties biomanufacturing to the same first-set insurance mechanism that supports machine tools, described below.

At the lower level, local governments created guidance funds to enable investment in the biomanufacturing space. The Shenzhen government created a synthetic biology fund to turbocharge the industry.[58] Shortly afterward, the Shenzhen government released a press release directing investment into the biomanufacturing industry.[59] Shenzhen is not alone. Guangzhou also created a biomanufacturing government guidance fund for investment in the sector.[60]

V. Results

The sector's results support the emphasis. MIIT reports that the biomanufacturing industry reached RMB 1.1 trillion (USD $165 billion) in scale over the 14th Five-Year Plan period. Chinese producers now account for more than 70% of global fermentation-product output. And Chinese applicants file more than 20% of the world's biomanufacturing patent applications.[61] Building on China's existing domination of the chemicals sector, biomanufacturing enables China to generate a lead in the next generation of chemical production technologies.

CASE STUDY 2: AEROSPACE

A principal target of the PRC's recent industrial policy is its aerospace sector. The PRC aims to build an indigenous large passenger aircraft [大飞机] through its national champion, the Commercial Aircraft Corporation of China (COMAC). That category comprises two programs. The C919 is a narrow-body aircraft now in service, and the wide-body C929 is currently under development.

The PRC also seeks to indigenize the supply chain required to build large passenger aircraft, including related industries along the supply chain such as engines, avionics, and other related components. In furtherance of that objective, China lavished money on the sector. CSIS identified approximately $49 billion in financing and subsidies through 2020. It projected total support of up to $72.1 billion. That is several times the roughly $22 billion in subsidies the WTO found Airbus received.[62]

I. Subsidies

The PRC heavily subsidizes its domestic aerospace industry. Those subsidies fall into two categories: 1) subsidies towards propping up its state champion; and 2) subsidies to indigenize current chokepoints in the supply chain that are necessary to build civilian aircraft. These subsidies came primarily through local and provincial governments.

Consider production first. The state capitalized and repeatedly injected additional funds into COMAC through its central-SOE shareholders. As mentioned above, CSIS estimated subsidies totaling roughly $49 billion but, with the opaque nature of the financial arrangements, it is impossible to determine a firm amount.[63] The program also carries formal national status, which adds to its perceived importance by the party-state. It is the large-aircraft special project [大型飞机重大专项] under the National Medium- and Long-Term Program for Science and Technology Development. That Program directed the state to "master the design, manufacture and systems-integration technologies of large aircraft" [掌握大型飞机的设计、制造和系统集成技术].[64]

Now consider the supply chain. In step with the State Council's command to focus on the aerospace industry, provinces and local governments implemented policies to spur development, manufacturing, and localization of aerospace technologies. The Pudong area of Shanghai hosts many of the aerospace suppliers critical to COMAC's success. The area also offered a series of programs targeted at developing the aerospace sector.[65] These subsidies were significant.[66] For example, Shanghai offered to subsidize 30% of aerospace research and development costs if certain conditions were met.[67] For certifying parts as airworthy, the Shanghai government offers up to 500,000 RMB, approximately $75,000, per certificate.[68] For manufacturing, Shanghai offered to subsidize 10% of the total investment in equipment and software to support manufacturing up to 100M RMB, approximately $15M, per project.[69] Shanghai was not the only one. Tianjin, another city in China, threw its hat in the ring to become a key area of Chinese commercial aviation development. Tianjin offered significant subsidies to relocate commercial aviation enterprises to the city. Tianjin's notice specifically targets projects that address key chokepoints in the aerospace industry and rewards these enterprises with subsidies of 10% of investment up to 5M RMB of investment or approximately $750,000.[70] For companies that received central government certificates, Tianjin would pay a one-time subsidy of 2M RMB or approximately $300,000.[71] These subsidies had a significant impact. Airbus built its first final assembly line (FAL) outside of France in Tianjin, delivering its first aircraft in 2009.[72] These facilities continued to expand. As shown in the satellite photo below taken in 2026, Airbus' Tianjin facilities now cover such a wide area that they are easily visible from space.



Figure 4 – Satellite Image from Vantor of Airbus' Final Assembly Line in Tianjin

China's most acute chokepoint is propulsion. The Aero Engine Corporation of China [中国航空发动机集团], founded in 2016, is developing the CJ-1000A [长江-1000A]. That engine is meant to replace the Franco-American made CFM International LEAP-1C that powers the C919 today. It falls under the aero-engines and gas turbines [航空发动机及燃气轮机] megaproject added in the 13th Five-Year Plan.[73] When the U.S. government restricted exports of aerospace equipment, especially engines, this had a significant impact on COMAC.[74] China seeks to develop its own engine to lessen the impact of a future ban on a sector the CCP views as critical. In pursuit of this objective, Chinese media reports that Chinese aerospace engineers work around-the-clock to develop a workable prototype.[75]

China also used subsidies to attract aerospace suppliers who support both international supply chains. This strategy targeted, among others, Airbus. For example, the Xi'an Aircraft Industry Group Company (XAC) makes the wings for the Airbus A320 as well as the COMAC C919, an aircraft of similar dimensions.[1] Airbus also helped French suppliers relocate to China to build out the Chinese supply chain.[76] This relocation included entering joint ventures with PRC suppliers that transferred key knowledge. To further attract more aerospace expertise, COMAC also prioritized suppliers that entered joint ventures with PRC firms, thus facilitating technology transfer.[77] This effort resulted in the creation of

[1] AVIC Xi'an Aircraft Industry Group Company Ltd. (中航西安飞机工业集团股份有限公司), Investor Relations Activity Record (No. 2024-015) [投资者关系活动记录表（编号：2024-015）], at 3 (Sept. 11, 2024), https://static.cninfo.com.cn/finalpage/2024-09-11/1221204639.PDF

more than a dozen ventures between Chinese firms and Western aerospace firms, allowing COMAC to rapidly accelerate its development processes.

II. Regulatory

The PRC has used regulatory barriers to help indigenize its aerospace industry. Various actors in the PRC party-state noted the strategic risk of relying on foreign aircraft. They frame indigenization in national-security and self-reliance terms. The same logic animates the megaproject designation.[78] The Chinese state wielded regulatory barriers to facilitate technology transfer, expedite adoption of domestically produced aircraft, and enable foreign certification of Chinese aircraft.

First, regulatory barriers enable technology transfer. As part of its administrative and licensing process, the PRC requires disclosure of sensitive aerospace technology.[79] This review occurs both at the central government level and the local provincial level.[80] Uncertainty about the applicable rules provides Chinese authorities with wide discretion to use administrative processes to pressure non-PRC companies to relinquish technology, restrict investments to protect domestic competitors, or otherwise act in furtherance of industrial policy objectives.[81] One legal treatise on foreign investment in the PRC stated that a Catalogue of Industries for Encouraging Foreign Investment[82] allows a wholly owned foreign entity to operate in a sector, but the Chinese authorities openly state they require a joint venture in the same sector.[83]

Airworthiness certification by the Civil Aviation Administration of China (CAAC) cuts both ways. It supplied the C919 domestic type certificate in September 2022, and the first delivery occurred in December 2022. Entry into service followed in May 2023. But certification and delivery decisions for foreign types are also available as leverage. China grounded the Boeing 737 MAX in March 2019. Its commercial service did not resume until January 2023. Boeing deliveries were paused again amid trade tensions in 2024 and 2025.[84]

Market access has served the same end. Joint-venture requirements and offsets were historically used to extract technology transfer into the PRC aviation supply chain.[85] More recently, in 2026, China delayed final approvals of Airbus aircraft to pressure the European Union Aviation Safety Agency to approve the COMAC C919.[86]

III. SOE Coordination

The PRC has used its SOEs' significant purchasing power to indigenize its supply chain. Air China [中国国际航空], China Eastern [中国东方航空], and China Southern [中国南方航空] are all state carriers. Each announced a firm order for 100 C919 aircraft, with deliveries scheduled from 2024 through 2031.[87] Industry observers described the purchase order process for C919 as "state directed," "coerced," and "choreographed" by the PRC government.[88] Aircraft purchases require PRC government approval.[89] China uses this leverage to balance purchases of foreign aircraft and to pressure Western firms to form joint ventures with Chinese firms to localize production.[90]

Additionally, China used its SOE airlines to coordinate purchases of aircraft from "strategic partners,"[91] specifically Airbus. In the market for large wide-body aircraft, there are two market leaders: Boeing and Airbus. While Boeing made certain limited investments in China, Airbus bent over backwards for the CCP. China is Airbus' largest sales market.[92] Airbus opened several sprawling facilities in China, including its first A320 FAL outside Europe in Tianjin as described above. Airbus also opened an airplane-recycling facility in Chengdu,[93] an A330 finishing facility in Tianjin (its first outside of Europe[94]) and a FAL for the H135 helicopter in Qingdao.[95] Beyond these facilities, Airbus invested in the Chinese aerospace technical ecosystem. Airbus opened a research and development center in Suzhou.[96] It also opened an innovation center in Shenzhen to "[access] a highly advanced digital innovation ecosystem."[97]

In return for Airbus selling its capabilities and know-how, China rewarded it handsomely. As mentioned above, China is Airbus's largest country market. While Boeing has not received a major Chinese aircraft order since 2017,[98] Airbus continues to see significant orders from Chinese state-owned carriers. The following chart shows orders for Airbus aircraft from Chinese state-owned carriers since 2017. **Based on publicly available information, these orders amounted to more than $58 billion.**

Year	Carrier	Estimated Value
2017	China Southern	$6 billion[99]
2022	Air China	Collectively $12.25 billion[100]
2022	China Eastern	
2022	China Southern	
2025	Air China	$9.53 billion[101]

2026	Air China	Undisclosed but multibillion[102]
2026	China Southern	$21.4 billion[103]
2026	China Eastern	$9.4 billion[104]
Total		**$58.58 billion**

IV. Guidance Funds

In tandem with these subsidies, regulatory measures, and SOE purchase agreements, the Chinese government created a series of government guidance funds to turbocharge the aerospace industry. In 2017, the Chinese government established the Central State-owned Enterprises Innovation Investment Guidance Fund to focus on aerospace and other areas.[105] The Sichuan Development (Holding) Co., Ltd. [四川发展引领资本管理有限公司], a provincial level investment fund functioning as a government guidance fund, lists aerospace among its areas of focus and invested in key parts of the aerospace value chain.[106] For example, Sichuan Development invested in the Chinese aerospace supplier LianShi Aviation Technology Co., Ltd. [炼石航空科技股份有限公司] a company that makes metallic aerospace components.[107] In another example, a Hunan government investment fund invested in Hunan Boyun New Materials Company, which supplies aircraft brakes.[108]

V. Results

Among the industries surveyed in this report, aerospace remains an area where China has struggled to catch up to Western competitors. Despite this significant state support, COMAC consistently failed to reach its production targets. It planned to deliver 75 C919s in 2025, but supply chain and geopolitical constraints forced it to cut that target to 25. Ultimately, it delivered 15. That matched its 2024 total and missed even the revised target by nearly half. The three state carriers planned for roughly 32 deliveries. They received about a dozen.[109] However, as shown above, China puts significant state support behind the aerospace sector and holds ambitions to rival the United States. The order backlog exceeds 1,000 aircraft even as annual deliveries stall in the low teens. The aircraft still depends on Western engines and avionics.

Additionally, it lacks FAA and EASA certification. Industry analysts expect that certification to take several more years. EASA test pilots did not begin verification flights in Shanghai until November 2025.[110] Meanwhile, airlines such as Ryanair, which currently purchases from Boeing, have expressed interest in purchasing COMAC planes should approval materialize. EASA test pilots did not

begin verification flights in Shanghai until November 2025.[111] Meanwhile, airlines such as Ryanair, which currently purchases from Boeing, have expressed interest in purchasing COMAC planes should approval materialize. However, without Western certification, the export markets that would justify the program's scale remain closed. SOE purchases guarantee demand, but they cannot manufacture airworthy supply.

CASE STUDY 3: SEMICONDUCTORS

China's semiconductor strategy is among the most critical, and most discussed, elements of the broader technological and economic competition.[112] While semiconductors with small-nanometer transistors that power leading-edge computing are also central to U.S. national and economic security, this section focuses on the PRC's strategy to dominate foundational-node or "legacy" semiconductors. The PRC has concentrated its financial firepower on mature ("foundational") nodes of 28nm and above, which power consumer-grade electronics that do not require high computing power, such as automotive controllers, power management, displays, and image sensors. Because of foundational models' essential role in cars, consumer electronics, and other manufactured products, they constitute a chokepoint input.

China released a semiconductor strategy to provide a comprehensive plan for meeting the country's semiconductor objectives.[113] This document called for the rapid expansion of China's integrated circuit production capacity, specifically calling out production at nodes in the 45/40 nanometer (nm) range, 32/28 nm range.[114] As described below, the 2020 policy kicked off significant subsidy efforts by local and provincial governments to turbocharge the semiconductor industry.

I. Subsidies

The PRC provides generous tax relief for semiconductor producers. In 2020, the State Council announced tiered corporate-income-tax relief tied to manufacturing capabilities [国发〔2020]8 号]. The operative language provides: "For state-encouraged integrated-circuit manufacturing enterprises or projects with a line width smaller than 28nm (inclusive) and an operating period of more than 15 years, enterprise income tax shall be exempted from the first year through the tenth year" [国家鼓励的集成电路线宽小于 28 纳米（含），且经营期在 15 年以上的集成电路生产企业或项目，第一年至第十年免征企业所得税]. Firms at 65nm and below with a 15-year horizon receive five years' exemption plus five years at half the statutory 25% rate. Firms at 130nm and below with a 10-year horizon receive two years' exemption plus three years at half rate [两免三减半].

The relief thus was not limited to leading-edge producers. It extended to producers of foundational semiconductor nodes. The same policy provided import-duty relief for inputs necessary to produce semiconductors with transistors smaller than 65 nanometers. And the policy was implemented across the provinces. Provincial tax administrations issued their own documents implementing the schedule.[115]

On top of corporate tax relief, the PRC offered semiconductor manufacturers generous tax deductions. The most significant is the 120% research-and-development super-deduction. It provides that "the research and development expenses actually incurred by integrated-circuit enterprises and industrial-mother-machine enterprises … shall, from January 1, 2023 to December 31, 2027, be additionally deducted before tax at 120% of the amount actually incurred" [集成电路企业和工业母机企业……在 2023 年 1 月 1 日至 2027 年 12 月 31 日期间，再按照实际发生额的 120%在税前扣除]. Capitalized research draws a 220% amortization allowance.[116] A parallel 5% value-added-tax super-credit for advanced-manufacturing enterprises supplements the income-tax measures.[117] All of these provisions operate as a subsidy on the industry because they enable different companies to collect money exceeding their expenditures.

At the provincial and local levels, government officials began to roll out schemes providing ***additional*** economic benefits to semiconductor firms that moved to their geographic area. Jiangsu province announced a program to sponsor national-level technology innovation centers with up to 30M RMB, or roughly $4.4M, and national-level manufacturing centers receiving no less than 30M RMB.[118] The city of Hefei provided subsidies for companies that purchased local equipment from local integrated circuit and packaging companies.[119]

II. Regulatory

The PRC uses a wide array of regulatory tools to indigenize its semiconductor sector. The below lays out the timeline of tightening restrictions China placed on foreign integrated circuits in its market.

First, the PRC has sharply limited the importation of foreign-made semiconductors, to cultivate its domestic production. In one government announcement, the PRC claimed that American-made semiconductors had serious network-security defects. The Cyberspace Administration of China's cybersecurity review of May 21, 2023 falsely found that Micron's products "have relatively serious potential network-security problems." Those problems, it said, posed a major risk to critical-information-infrastructure supply chains.

It therefore directed that "operators of critical information infrastructure shall stop purchasing Micron's products" [存在较严重网络安全问题隐患……国内关键信息基础设施的运营者应停止采购美光公司产品].[120]

China increased the pressure in March 2024 when it issued guidelines requiring the phaseout of Intel and AMD microprocessors from government computers.[121] The notice required PRC government agencies above the township level to buy "safe and reliable" processors and operating systems.[122] All companies meeting the criteria were Chinese.[123] The CCP also ratcheted up the pressure by purportedly issuing "Document 79" [79 号文, 2022], which directed state firms to replace foreign hardware and software by 2027 under the *xinchuang* [信创] program.[124]

With the government market closed off, China set out to bring commercial industry to heel. In April 2024, the PRC government directed telecommunications firms to phase out foreign chips that are key to their networks by 2027.[125] In December 2024, four PRC industry associations jointly misled members that U.S. chip products are "no longer safe, no longer reliable" [不再安全、不再可靠].[126] They counseled caution in procurement.[127] In parallel, the Internet Society of China urged domestic Chinese companies to think carefully before procuring U.S. chips and instead seek to expand cooperation with firms from countries or regions other than the United States.[128]

In a move to increase pressure on foreign foundational node chips, in January 2025, China's Ministry of Commerce (MOFCOM) opened an investigation into U.S.-origin mature-node analog chips to determine whether they harmed PRC industry.[129] In opening the investigation, MOFCOM cited the CHIPS and Science Act's subsidies and claimed they gave American firms an "unfair advantage."[130] MOFCOM's statement conveniently left out the plethora of subsidies given to Chinese firms. MOFCOM followed this inquiry with an anti-dumping investigation into American IC chips announced in September 2025.[131] This near-constant pressure did not end.

In early 2026, the U.S. government approved the sale of NVIDIA's H200 chips for export to China.[132] According to a report, the U.S. approved the sale of H200 chips to multiple Chinese firms including Alibaba, Tencent, and JD.com.[133] However, the PRC government refused the H200 chips, instead pushing its own homegrown industry.[134]

The above series of events shows the constant regulatory pressure China applies to manufacture demand for its indigenous chipmakers. Beginning in May

2023 and continuing until the present, the Chinese government applied near-constant pressure on the government and domestic industry to buy Chinese chips.

III. SOE Coordination

The PRC uses its large public sector as a means of expanding its semiconductor industry. This is largely through the SOEs' significant purchasing power. For instance, PRC telecommunications carriers, which are all SOEs, promulgated new procurement guidelines requiring domestic chips. The three state carriers, China Mobile, China Telecom, and China Unicom, [中国移动, 中国电信, 中国联通] award scoring bonuses in centralized-procurement [集采] tenders to domestic processors and "safe and reliable" platforms. They reportedly face directives to phase foreign-core chips out of their networks by 2027. And they increasingly reserve server-tender lots for domestically designed CPUs [鲲鹏, 海光, 飞腾].[135] SOE demand-pull thereby absorbs the mature-node capacity that state subsidy has built. That closes the loop between supply-side subsidy and demand-side procurement.

IV. Guidance Funds

The PRC has aggressively subsidized the manufacturing of legacy semiconductor nodes. This is primarily through its "Big Funds" [国家集成电路产业投资基金]. The Big Funds invest in PRC semiconductor firms, often in exchange for equity and control. Big Fund capital has grown across three phases. Phase I raised RMB 138.7 billion (USD $20.8 billion) in 2014. Phase II raised RMB 204.15 billion (USD $30.61 billion) in 2019. Phase III registered RMB 344 billion (USD $51.57 billion) in 2024. Analysts estimate that Phase III alone could mobilize on the order of RMB 1.5 trillion (USD $225 billion) once local-government and social co-investment is levered in. [136] Semiconductor Manufacturing International Corporation (SMIC) [中芯国际] and Hua Hong Semiconductor are among the Fund's principal portfolio companies.[137]

V. Results

China's aggressive push into this node of the semiconductor supply chain is unfair to international firms, but it is working. The PRC's aggressive industrial policy towards semiconductors has increased its share of global mature-node foundry capacity from 29–31% in 2023 to 34% in 2024, second to Taiwan's 43%.[138] TrendForce projects "China's breakneck expansion is expected to propel it past Taiwan by 2027," with the PRC reaching approximately 47% of mature-node capacity and Taiwan falling to about 36%.[139] The PRC's national integrated-circuit output reached 451.4 billion units in 2024, up 22.2% year-on-year. [140] Semiconductor Equipment and Materials International (SEMI), a leading

semiconductor trade organization, counts 57 of the 97 new fabs slated to begin operation worldwide between 2023 and 2025 as located in the PRC.[141]

The trajectory of SMIC, China's national foundry champion, illustrates the pattern. For full-year 2025, SMIC reported revenue of US$9.33 billion (up 16.2% from US$8.03 billion in 2024, which itself was up 27%), a gross margin of 21.0% (recovered from 18.0% in 2024 but well below the 30.8% of 2022), capacity utilization of 93.5% (up roughly eight points from 85.6%), capital expenditure of roughly US$7.3–8.1 billion per year, and monthly capacity exceeding 1,059,000 8-inch-equivalent wafers, up from 948,000, an increase of roughly 111,000 wafers per month over the prior year.[142] The company is running four simultaneous mature-node fab projects (中芯京城 in Beijing, 中芯东方 in Shanghai's Lingang, 中芯西青 in Tianjin, and 中芯深圳 in Shenzhen).

So far, the PRC's semiconductor industrial policy is largely defensive. It seeks to protect and subsidize its domestic industry to reduce foreign reliance. But the line between its defensive and offensive posture is a thin one. The more the PRC obtains global production capacity in foundational semiconductors, the greater control it has over the global supply chain of this node. This supply chain is essential to many consumer electronics. As a result, the PRC's creeping control presents a risk to the economic interests of the United States and its allies.

CASE STUDY 4: MACHINE TOOLS

The PRC has designated machine tools the "industrial mother machines" [工业母机/工作母机]. They comprise the capital equipment that makes all other manufacturing equipment. The CCP elevated high-end computer-numerical-control (CNC) machine tools [高档数控机床] to explicit chokepoint status. It listed them among the top ten priority fields of Made in China 2025. And it funded them through the "04 Special Project" [04 专项], one of the sixteen national science-and-technology megaprojects under the 2006 Program.[143] The PRC specifically frames the importance of "industrial mother machines," a term used by the CCP to describe machine tools, as a key part of its military modernization.[144]

CNC machines play an important role in the machining of industrial components.[145] CNC machines enable precision milling, drilling, and cutting operations at high volumes.[146] The PRC is the world's largest producer and consumer of machine tools.[147]

The PRC is especially sensitive to the chokepoint nature of the machine tool sector. SASAC and the party leadership have repeatedly listed "工业母机" (industrial mother machines) first among the fields requiring breakthroughs in

key core technologies.[148] Placing this field first signals its importance to PRC industrial policy.

I. Subsidies

The sector draws significant state subsidies to turbocharge it. These funds can be grouped into project funds, tax policies, and insurance subsidies. The first is 04-project money. The PRC State Council's creation of Project 4 identified it as a key priority area, thus unlocking additional funding.[149] Moreover, identifying this area as a project signals to the local governments that they should follow suit in their subsidies for CNC machining equipment. For example, the Changzhou government provides an ***additional*** subsidy of 20% of the special state support funds, up to a maximum of 3 million yuan for companies participating in a major national science and technology project.[150] The third is the tax code. At the central government level, the 120% research-and-development super-deduction covers industrial-mother-machine enterprises by its own terms, alongside integrated-circuit firms.[151] Moreover, high-end CNC machine companies qualify as "high and new technology enterprises" meaning the government applies the lower 15% rate.[152]

II. Regulatory

China's preference for domestically produced CNC machines dates back to at least 2015. In 2015, China recognized that businesses are hesitant to adopt expensive products that lack a track record, which would inhibit development of its own domestic industry. To solve this issue, the PRC launched a state-sponsored insurance plan that provides initial customers of certain newly developed products, such as CNC machines, with quality- and liability-related risk insurance.[153] This program remains active as of this report.[154]

To complement this insurance scheme, China implemented a demand-side specific policy in 2017 as part of its Military-Civil Fusion Special Action Plan.[155] This Action Plan called for greater application of high-end CNC machines in China's military industry as well as a host of policies to favor domestically produced CNC machines.[156] In 2018, the Chinese government expanded this policy by launching a whole-of-government approach to spurring the domestic CNC machine industry.[157] The policy called on multiple bureaus such as the State Taxation Administration, the National Development and Reform Commission, the National Health Commission, and the State-owned Assets Supervision and Administration Commission of the State Council to coordinate policy that would spur the research, development, and adoption of domestically produced CNC machines.[158] Overall, these policies push domestic companies to purchase domestically produced CNC machines to spur China's domestic industry.

III. SOE Coordination

China treats CNC machines as strategic core assets and thus maintains significant control over the industry. This strategic importance dates to the early days of the PRC. In 1953, the First Ministry of Machine Building created 18 machine tool factories that became known as the "Eighteen Arhats" of the PRC's machine tool industry.[159] Even though the PRC later privatized many businesses, most of the largest CNC machine manufacturers are still SOEs. For example, the China General Technology Group (Genertec, [中国通用技术集团] is the dominant SOE that treats machine tools as a core business. It absorbed the bankrupt Shenyang Machine Tool [沈阳机床], whose reorganization was completed in December 2019. Genertec also absorbed Dalian Machine Tool [大连机床]. And it thereby gathered several of the "Eighteen Arhats" under one roof.[160] SASAC and Genertec's leadership styled the group as the machine-tool industry's "national team" [国家队]. The group pledged to "unswervingly make the development of high-end machine-tool equipment its first core main business" [坚定不移把发展高端机床装备作为第一核心主业].[161]

Chinese CNC machine companies then sell to other state-owned Chinese companies to prop up their business. For example, Kede Numerical Control Co., ltd. (Kede) [科德数控股份有限公司] notes that its largest customers are Chinese SOEs such as AVIC, the Aeroengine Corporation of China, and the China State Shipbuilding Corporation (the predecessor to the state-owned China Shipbuilding Industry Company).[162] Shenyang Machine Tool Company (Shenyang Machine Tool) counts business with AVIC subsidiaries and Genertec as providing more than 70% of its operating revenue in 2023.[163]

Qinchuan Machine Tool Group, [秦川机床工具集团股份公司], another state-owned machine tool company, relies on major sales to the Shanghai Aircraft Manufacturing Company (a state-owned aerospace company), China Shipbuilding Industry Company (a state-owned ship builder), and universities associated with China's military.[164] Yuhuan CNC Machine Tool Co. Ltd. supplies Chinese state-owned firms such as Shenyang Liming Aerospace.[165] This coordinated effort ensures CNC machine manufactures have adequate customer demand to deploy and test their products to iterate for the larger marketplace.

IV. Guidance Funds

The machine tools industry is so important to the Party-State that the Chinese government created the National Manufacturing Transformation and Upgrading Fund [国家制造业转型升级基金] and funded it with 15 billion yuan.[166] This central government guidance fund is supplemented by local guidance funds such as the

Suzhou Innovation Investment Group and the Jiangsu Provincial Government Investment Fund.[167] This fund invested in a series of companies including Kede discussed above.[168]

V. Results

PRC firms dominate low-range and mid-range CNC equipment but remain import-dependent on high-end CNC.[169] For low-end CNC equipment, domestic localization reached essentially 100%.[170] For mid-range CNC equipment, the localization rate of mid-range CNC machine tools increased from 62.6% to 73.5%.[171] Domestic localization of high-end CNC sat in the low single digits for years. It rose from roughly 2% to 6% between 2013 and 2017, before more recent gains.[172] According to a 2024 report from the Chinese government, Project No. 4 increased the domestic market share of high-end CNC machines to over 30%.[173]

Two important ramifications follow for the United States and its allies. The overcapacity that signals domestic inefficiency also creates both the incentive and the means for China to dump abroad. And chokepoint dominance built for defensive autarky doubles as offensive leverage, as the critical-minerals controls of 2024 and 2025 showed.

IMPLICATIONS FOR U.S. POLICY

As these case studies demonstrate, the PRC's command-and-control economic model is deliberately built through sustained government intervention, coordinated investment, protected demand, and control over strategic supply chains. Across sectors, Beijing has used these tools to reduce the PRC's dependence on foreign suppliers while expanding the world's dependence on Chinese production. The CCP has not achieved technological leadership in every sector, but its ability to mobilize capital, build capacity at scale, and sustain investment over long time horizons presents a significant challenge to U.S. manufacturing capacity and national security.

The implications for U.S. policy are clear. The United States must rebuild critical industrial capabilities that have been lost over decades. A durable response requires a coordinated industrial strategy that treats productive capacity, resilient supply chains, technological leadership, and a skilled workforce as strategic national assets.

Recognizing that the PRC's state-directed industrial planning poses an existential threat to American industry and technical leadership, the United States must take immediate action. That action should be the formulation and execution of a deliberate industrial strategy to identify key U.S. industries, revitalize them,

and help defend them against unfair competition from China. Such a strategy necessarily involves both the United States and its allies, and it requires the launching of a multi-decade, whole-of-government industrial mobilization effort to rebuild American strength, including in towns that were hollowed out by the CCP's practices. Such a project would need to be national in its scope and treated with the urgency of the Manhattan Project or the interstate highway system. The success of the effort will depend on leadership and cooperation across American society, including government, the private sector, and civil society. American manufacturers, workers, and innovators are an essential part of ensuring the effectiveness of a successful whole-of-society industrial strategy.

On the government side, in order for the bipartisan effort to have the intended impact, U.S. policymakers should be prepared to sustain this commitment across multiple administrations and election cycles. The problems that must be addressed are significant and complex, and the U.S. strategic response must be bold and forward-leaning and pursued with a sense of urgency.

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[4] *China's Economy is Forecast to Grow Faster Than Expected in 2026,* GOLDMAN SACHS (Nov. 21, 2025), https://web.archive.org/web/20260809145539/https://www.goldmansachs.com/insights/articles/chinas-economy-is-forecast-to-grow-faster-than-expected-in-2026.
[5] H. Res. 5, 119th Cong. § 4(a) (2025).
[6] Matthew Hipple, *China's Navy Is Using Quantity to Build Quality*, MAR. EXEC. (Feb. 18, 2024), https://maritime-executive.com/editorials/china-s-navy-is-using-quantity-to-build-quality.
[7] Matthew P. Funaiole, Brian Hart & Aidan Powers-Riggs, *Murky Waters: Navigating the Risks of China's Dual-Use Shipyards*, CTR. FOR STRATEGIC & INT'L STUD. (Mar. 25, 2025), https://features.csis.org/hiddenreach/china-shipyard-tiers/.
[8] *Creating Helpful Incentives to Produce Semiconductors for America Act*, Pub. L. No. 116-283, div. H, tit. XCIX, 134 Stat. 3388, 4849 (2021).
[9] *Accelerating Deployment of Versatile, Advanced Nuclear for Clean Energy (ADVANCE) Act of 2024*, Pub. L. No. 118-67, 138 Stat. 1448, 42 USC 2011 note.
[10] *See, e.g., SCIO Briefing on Promoting High-Quality Development: State-Owned Assets Supervision and Administration Commission of the State Council*, PRC STATE COUNCIL INFO. OFF. [国务院新闻办公室] (Aug. 20, 2024), https://web.archive.org/web/20260802145011/http://english.scio.gov.cn/m/pressroom/2024-08/20/content_117377814_9.htm.
[11] *See, e.g., The Party Flag Flies High at the Grassroots Level | Aero Engine Corporation of China Targets Key Core Technology Bottlenecks and Forms the "Forging Hearts"*

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[12] Xi Jinping [习近平], *Certain Major Issues Concerning the National Medium- and Long-Term Economic and Social Development Strategy* [国家中长期经济社会发展战略若干重大问题], QIUSHI [求是] (Oct. 31, 2020), https://web.archive.org/web/20260802150812/https://www.gov.cn/xinwen/2020-10/31/content_5556349.htm (speech delivered at the Seventh Meeting of the Central Financial and Economic Affairs Commission on Apr. 10, 2020).

[13] *Id.*

[14] *Id.*

[15] *Id.*

[16] *Id.*

[17] Note: the CCP also places its thumb on the scale of prices when it deems necessary. *See* Select Comm. on the Strategic Competition Between the United States & the Chinese Communist Party, *Predatory Pricing: How the Chinese Communist Party Manipulates Global Minerals Prices to Maintain Its Dominance* (Nov. 12, 2025), https://chinaselectcommittee.house.gov/media/reports/predatory-pricing-how-the-chinese-communist-party-manipulates-global-minerals-prices-to-maintain-its-dominance.

[18] BARRY NAUGHTON, THE RISE OF CHINA'S INDUSTRIAL POLICY, 1978 TO 2020 20–21 (Universidad Nacional Autónoma de México, Facultad de Economía/CECHIMEX 2021), https://dusselpeters.com/CECHIMEX/Naughton2021_Industrial_Policy_in_China_CECHIMEX.pdf.

[19] *Id.* at 80–82.

[20] NAUGHTON, *supra* note 18, at 20–21 (arguing that China lacked a systematic industrial policy until about 2006).

[21] Lee Branstetter & Guangwei Li, *The Challenges of Chinese Industrial Policy*, 3 ENTREPRENEURSHIP & INNOVATION POL'Y & ECON. 77, 82–85 (2024), https://www.journals.uchicago.edu/doi/10.1086/727768.

[22] *Id.* at 88–90.

[23] *See, e.g.* Beijing News [新京报], *Li Keqiang: Chinese Foreign Trade Must Turn from "Large-Scale Import and Export" to "Importing and Exporting High-Quality Products"* [李克强：中国外贸要从“大进大出”转向“优进优出”], PRC STATE COUNCIL INFO. OFF. [国务院新闻办公室] (Apr. 10, 2015), http://www.scio.gov.cn/xwfb/gwyxwbgsxwfbh/wqfbh_2284/2015n_9477/2015n04y13r/zxbd_9593/202207/t20220715_185831.html.

[24] Xi Jinping [习近平], *Certain Major Issues Concerning the National Medium- and Long-Term Economic and Social Development Strategy* [国家中长期经济社会发展战略若干重大问题], QIUSHI [求是] (Oct. 31, 2020), https://web.archive.org/web/20260802150812/https://www.gov.cn/xinwen/2020-10/31/content_5556349.htm (speech delivered at the Seventh Meeting of the Central Financial and Economic Affairs Commission on Apr. 10, 2020); *see also* Wang Zhonghong [王忠宏] & Zhang Changling [张长令], *Fully Leveraging the Role of*

Advanced Manufacturing Clusters [充分发挥先进制造业集群作用], CPC NEWS [中国共产党新闻网] (Dec. 13, 2023), http://theory.people.com.cn/n1/2023/1213/c40531-40137621.html.

[25] CCP Central Committee & State Council [中共中央、国务院], *National Standardization Development Outline* [国家标准化发展纲要], GOV.CN (Oct. 10, 2021), https://www.gov.cn/zhengce/2021-10/10/content_5641727.htm; PRC Ministry of Indus. & Info. Tech. et al. [工业和信息化部等], *Implementation Plan for the New-Industry Standardization Pilot Program (2023–2035)* [新产业标准化领航工程实施方案（2023—2035 年）], MIIT [工信部] (Aug. 2023), https://www.miit.gov.cn/zwgk/zcwj/wjfb/tz/art/2023/art_8d26688ad0aa422eaa5ebba5dceac908.html [hereinafter Standardization Pilot Program] (covering eight emerging industries, including next-generation information technology, high-end equipment, and civil aviation, and nine future industries, including biomanufacturing).

[26] *See* Branstetter & Li, *supra* note 21, at 95–100; *see also* Gerard DiPippo, Ilaria Mazzocco, Scott Kennedy & Matthew P. Goodman, *Red Ink: Estimating Chinese Industrial Policy Spending in Comparative Perspective*, CTR. FOR STRATEGIC & INT'L STUD. (May 23, 2022), https://www.csis.org/analysis/red-ink-estimating-chinese-industrial-policy-spending-comparative-perspective.

[27] PRC Nat'l People's Cong. [全国人民代表大会], *Outline of the 14th Five-Year Plan for National Economic and Social Development and the Long-Range Objectives Through the Year 2035* [中华人民共和国国民经济和社会发展第十四个五年规划和 2035 年远景目标纲要], GOV.CN (Mar. 13, 2021), https://www.gov.cn/xinwen/2021-03/13/content_5592681.htm.

[28] Branstetter & Li, *supra* note 21, at 100–05.

[29] PRC Nat'l People's Cong. [全国人民代表大会], *Outline of the 14th Five-Year Plan for National Economic and Social Development and the Long-Range Objectives Through the Year 2035* [中华人民共和国国民经济和社会发展第十四个五年规划和 2035 年远景目标纲要], GOV.CN (Mar. 13, 2021), https://www.gov.cn/xinwen/2021-03/13/content_5592681.htm.

[30] DiPippo, Mazzocco, Kennedy & Goodman, *supra* note 26, at 1–2, 30 (estimating Chinese industrial-policy spending at $248 billion, or 1.73% of GDP, in 2019, versus 0.67% of GDP for South Korea and 0.39% of GDP for the United States).

[31] PRC MINISTRY OF FIN. ET AL. [财政部等], *Announcement on Raising the R&D Expense Super-Deduction Ratio for Integrated-Circuit and Industrial Machine Tool Enterprises* [关于提高集成电路和工业母机企业研发费用加计扣除比例的公告], Announcement [2023] No. 44 [财政部 税务总局 国家发展改革委 工业和信息化部公告 2023 年第 44 号] (Sept. 12, 2023), https://www.gov.cn/zhengce/zhengceku/202309/content_6905802.htm; PRC STATE TAX'N ADMIN. [国家税务总局], *Interpretation of the new policy for additional pre-tax deduction of R&D expenses in 2023* [2023 年研发费用税前加计扣除新政解读] (April 21, 2023), https://www.chinatax.gov.cn/chinatax/c102191r/c5192681/content.html.

[32] PWC, *China, People's Republic China of: Corporate – Taxes on Corporate Income* (last reviewed July 22, 2026), https://taxsummaries.pwc.com/peoples-republic-of-china/corporate/taxes-on-corporate-income.

[33] PRC STATE TAX'N ADMIN. [国家税务总局], *High-Tech Enterprises Are Subject to a Reduced Corporate Income Tax Rate of 15%* [高新技术企业减按 15%税率征收企业所得税] (Aug. 10, 2021), https://www.chinatax.gov.cn/chinatax/c101915/c5167710/content.html.

[34] Laney Zhang, *Chinese Law on Private Ownership of Real Property*, LIB. OF CONG., IN CUSTODIA LEGIS (Mar. 10, 2015), https://blogs.loc.gov/law/2015/03/chinese-law-on-private-ownership-of-real-property/.

[35] Branstetter & Li, *supra* note 21, at 85–86.

[36] *Id.* at 86 (citation omitted).

[37] PRC GEN. OFF. OF THE STATE COUNCIL [国务院办公厅], *Notice on Issuing the New Energy Vehicle Industry Development Plan (2021–2035)* [关于印发新能源汽车产业发展规划（2021—2035 年）的通知], Guo Ban Fa [2020] No. 39 [国办发〔2020]39 号] (Oct. 20, 2020), https://www.gov.cn/zhengce/content/2020-11/02/content_5556716.htm.

[38] *Id.*

[39] Ngor Luong, Zachary Arnold & Ben Murphy, *Understanding Chinese Government Guidance Funds: An Analysis of Chinese-Language Sources*, CTR. FOR SEC. & EMERGING TECH. (Mar. 2021), https://cset.georgetown.edu/publication/understanding-chinese-government-guidance-funds/.

[40] *RMB 344 Billion! Big Fund Phase III Established* [3440 亿元！国家芯片大基金三期落地], TENCENT NEWS [腾讯新闻] (May 27, 2024), https://news.qq.com/rain/a/20240527A04TYN00 (reporting registration data from the National Enterprise Credit Information Publicity System [国家企业信用信息公示系统]).

[41] PRC GEN. OFF. OF THE STATE COUNCIL [国务院办公厅], *Guiding Opinions on Promoting the High-Quality Development of Government Investment Funds* [关于促进政府投资基金高质量发展的指导意见], Guo Ban Fa [2025] No. 1 [国办发〔2025]1 号] (JAN. 7, 2025), (Jan. 7, 2025), https://www.gov.cn/zhengce/content/202501/content_6999491.htm.

[42] Camille Boullenois, Malcolm Black & Alessia Caruso, *China's Next-Generation Industrial Policy*, RHODIUM GRP. (May 11, 2026), https://rhg.com/research/chinas-next-generation-industrial-policy/.

[43] The PRC appears to increasingly prioritize biotechnology in its industrial policy. In Premier Li Qiang's *Report on the Work of the Government for 2025*, biomanufacturing ranked alongside quantum technology, embodied intelligence, and 6G telecommunications. Those were the only four future industries named for a new investment-growth mechanism. *See* Li Qiang [李强], *Report on the Work of the Government* [政府工作报告], NAT'L PEOPLE'S CONG. [全国人民代表大会] (Mar. 5, 2025), https://www.moj.gov.cn/pub/sfbgw/zwgkztzl/2025nianzhuanti/2025qglh20250219/lhdbg20250219/zfgzbg20250219/202503/t20250312_515779.html. Li's 2026 Report went further. It kept biomanufacturing on the list, expanded the list to six, and added risk-sharing to the mechanism. The PRC would "establish a mechanism for increasing investment in and sharing the risks of future industries, and cultivate and develop future industries such as future energy, quantum technology, biomanufacturing, embodied intelligence, brain-computer interfaces, and 6G" [建立未来产业投入增长和风险分担机制，培育发展未来能源、量子科技、生物制造、具身智能、脑机接口、6G 等未来产业]. The same passage names integrated circuits and aerospace as "new pillar industries," which places three of this memorandum's four sectors in the 2026 Report's two priority tiers. *See* Li Qiang [李强], *Report on the Work of the Government* [政府工作报告], NAT'L PEOPLE'S CONG. [全国人民代表大会] (Mar. 5, 2026),

https://www.moj.gov.cn/pub/sfbgw/zwgkztzl/2026nianzhuanti/2026qglh0206/lhjj20260206/lhjjyw20260206/202603/t20260313_532786.html.

[44] *See, e.g.,* HEILONGJIANG GOV'T GEN. OFF. [黑龙江省人民政府办公厅], *Notice from the General Office of the People's Government of Heilongjiang Province on Issuing the "Several Policy Measures of Heilongjiang Province to Support the High-Quality Development of the Biomanufacturing Industry*" [黑龙江省人民政府办公厅关于印发《黑龙江省支持生物制造产业高质量发展若干政策措施》的通知], Hei Zheng Ban Gui [2026] No. 2 [黑政办规〔2026]2 号] (Feb. 14, 2026), https://www.hlj.gov.cn/hlj/c108373/202602/c00_31915332.shtml.

[45] *Id.*

[46] *Id.*

[47] *Id.*

[48] Beijing Mun. Sci. & Tech. Comm'n et al. [北京市科学技术委员会等], Notice *on Issuing the "Beijing Action Plan for Accelerating the Innovative Development of the Synthetic Biology Manufacturing Industry (2024-2026)*"[关于印发《北京市加快合成生物制造产业创新发展行动计划（2024-2026 年）》的通知], Jing Ke Fa [2024] No. 14 [京科发〔2024]14 号] (Sept. 14, 2024), https://www.beijing.gov.cn/zhengce/zhengcefagui/202411/t20241129_3952690.html?

[49] *Id.*

[50] *Id.*

[51] *Biosecurity Law of the People's Republic of China* [中华人民共和国生物安全法], NPC.GOV.CN (adopted Oct. 17, 2020, effective Apr. 15, 2021), http://www.npc.gov.cn/c2/c30834/202010/t20201017_308278.html; *Regulations of the People's Republic of China on the Administration of Human Genetic Resources* [中华人民共和国人类遗传资源管理条例], GOV.CN (June 10, 2019), https://www.gov.cn/zhengce/content/2019-06/10/content_5398829.htm.

[52] PRC MINISTRY OF INDUS. & INFO. TECH. [工业和信息化部], *Notice on Cultivating Biomanufacturing Pilot-Scale Capacity-Building Platforms* [关于开展生物制造中试能力建设平台培育工作的通知], Gong Xin Ting Lian Xiao Fei Han [2025] No. 234 [工信厅联消费函〔2025]234 号] (June 11, 2025), https://www.miit.gov.cn/zwgk/zcwj/wjfb/tz/art/2025/art_cf8a18ad0acc4b69c70ed2a7cf85ff5.html (three-year re-review; removal for strain-leakage incidents causing significant economic loss; and pilot use of commitment-and-filing mechanisms [承诺备案制] (hereinafter Notice No. 234).

[53] Du Yanfei [杜燕飞], *Biomanufacturing Accelerates, Driving New Industrialization Toward a "Green" Future* [生物制造产业提速 推动新型工业化向"绿"而行], PEOPLE'S DAILY ONLINE [人民网] (June 30, 2026), http://finance.people.com.cn/n1/2026/0630/c1004-40750822.html (reporting MIIT data).

[54] PRC MINISTRY OF INDUS. & INFO. TECH. ET AL. [工业和信息化部等], *Implementation Opinions on Promoting Innovation and Development of Future Industries by the Ministry of Industry and Information Technology and Seven Other Departments* [关于推动未来产业创新发展的实施意见], MIIT Joint Document [2024] No. 12 [工信部联科〔2024]12 号] (Jan. 18, 2024), https://www.miit.gov.cn/zwgk/zcwj/wjfb/yj/art/2024/art_ad15b0f08a714fd8888c0e31468b8c54.html.

[55] PRC MINISTRY OF INDUS. & INFO. TECH. ET AL. [工业和信息化部等七部门], *Implementation Opinions on Promoting the Innovative Development of Future Industries*

[关于推动未来产业创新发展的实施意见] (Jan. 29, 2024), https://www.gov.cn/zhengce/zhengceku/202401/content_6929021.htm [hereinafter Implementation Opinions on Future Industries].

[56] Du, *supra* note 53 (reporting SDIC's investment of more than RMB 5 billion in nearly 33 biomanufacturing companies through six market-based funds, and describing measures adopted in Shanghai, Guangdong, and Heilongjiang).

[57] Notice No. 234, *supra* note 52 ["用好首台（套）、首批次保险补偿等政策，引导金融机构和社会资本加大对平台建设支持力度"]; *see also* PRC MINISTRY OF INDUSTRY & INFORMATION TECHNOLOGY [工业和信息化部], *Notice on Issuing the Guidance Catalog for the Promotion and Application of First-Set Major Technical Equipment (2024 Edition)* [关于印发《首台（套）重大技术装备推广应用指导目录（2024 年版）》的通知], Gong Xin Bu Zhong Zhuang Han [2024] No. 254 [工信部重装函〔2024〕254 号] (Sept. 2, 2024), https://www.gov.cn/zhengce/zhengceku/202409/content_6974868.htm [hereinafter Guidance Catalog for First-Set Major Technical Equipment (2024 Edition)].

[58] SHENZHEN MUN. SCI. & TECH. INNOVATION BUREAU ET AL. [深圳市科技创新局等], *Announcement from Shenzhen Municipal Finance Bureau and Shenzhen Science and Technology Innovation Commission Regarding the Public Selection of Management Institutions for the Shenzhen Synthetic Biology Industry Fund* [关于公开遴选深圳市合成生物产业基金管理机构的公告] (Dec. 21, 2022), https://stic.sz.gov.cn/xxgk/tzgg/content/post_10352737.html.

[59] SHENZHEN MUN. SCI. & TECH. INNOVATION BUREAU ET AL. [深圳市科技创新局等], *Several Measures of Shenzhen Municipality to Promote the High-Quality Development of the Biomanufacturing Industry Led by Synthetic Biology Innovation* [市科技创新局 市发展改革委 市市场监管局 市卫生健康委关于印发《深圳市推动合成生物创新引领生物制造产业高质量发展若干措施》的通知] (Apr. 16, 2026), https://stic.sz.gov.cn/xxgk/tzgg/content/post_12740127.html.

[60] *A 10 billion yuan bio-manufacturing industry fund cluster was established in Baiyun District, Guangzhou* [100 亿元生物制造产业基金群在广州白云落地], CHINA NEWS NETWORK [中国新闻网] (Nov. 3, 2025), https://m.sohu.com/a/950561388_123753.

[61] Du, *supra* note 53; *see also MIIT to Compile and Issue a 15th Five-Year Plan for Biomanufacturing Development* [工信部将编制发布"十五五"生物制造发展规划], XINHUA [新华网] (Dec. 19, 2025), http://www.news.cn/tech/20251219/55ec48807c39490087bfbf65da5a19cc/c.html.

[62] Scott Kennedy, *China's COMAC: An Aerospace Minor Leaguer*, CNTR. FOR STRATEGIC & INT'L STUD.: TRUSTEE CHINA HAND (Dec. 7, 2020), https://www.csis.org/blogs/trustee-china-hand/chinas-comac-aerospace-minor-leaguer (identifying RMB 328.5 billion, approximately $49 billion, in financing and subsidies, and projecting "the potential total government support through 2020 to $72.1 billion," against roughly $22 billion the WTO found Airbus had received); see also *China's Stalled Aircraft Dreams*, CSIS: CNTR. FOR STRATEGIC & INT'L STUD.: Big Data China, https://www.csis.org/programs/chinese-business-and-economics/chinas-stalled-aircraft-dreams.

[63] *Id.*

[64] PRC STATE COUNCIL [国务院], *National Medium- and Long-Term Program for Science and Technology Development (2006–2020)* [国家中长期科学和技术发展规划纲要（2006—2020 年）], Guo Fa [2005] No. 44 [国发〔2005]44 号] (Feb. 9, 2006)

https://www.gov.cn/gongbao/content/2006/content_240244.htm [hereinafter National Medium- and Long-Term Program] (designating large aircraft [大型飞机] among the sixteen national science-and-technology megaprojects).

[65] PUDONG NEW AREA SCI & ECON. COMM'N [浦东新区科技和经济委员会], *Notice on Launching the Application for Special Funding for the 2020 Pudong New Area's Several Policy Measures to Promote High-Quality Development of Key Advantageous Industries* (*Encouraging Industrial Chain Collaboration and Linkage—Aerospace Industry)* (July 28, 2020), [关于开展 2020 年度浦东新区促进重点优势产业高质量发展若干政策措施（鼓励产业链协同联动—航空产业）专项资助申报工作的通知] (Mar. 24, 2024), https://www.pudong.gov.cn/zwgk/ysqzzdgk-kjw/2024/323/334185.html.

[66] SHANGHAI MUN. COMM'N OF ECON. AND INFORMATIZATION [上海市经济和信息化委员会] *Shanghai issues policies to support development of industrial chain for large civil aircraft*, SHANGHAI MUN. GOV'T (July 19, 2024), re-printed at Lin-gang Special Area, https://web.archive.org/web/20260803191227/https://en.lingang.gov.cn/html/website/lg/English/Policies/Texts/1815577281657131010.html.

[67] Shanghai Economic and Information Technology Department [沪经信装], *Notice on Issuing the "Several Policy Measures of Shanghai Municipality on Supporting the Development of the High-End Industrial Chain of Large Civil Aircraft and Promoting the Construction of a World-Class Civil Aviation Industrial Cluster"* [关于印发《上海市关于支持民用大飞机高端产业链发展 促进世界级民用航空产业集群建设的若干政策措施》的通知], Hu Jing Xin Zhuang [2024] No. 472 [[沪经信装〔2024]472 号] (July 1, 2024), SHANGHAI MUN. GOV'T, https://web.archive.org/web/20260803192003/https://www.shanghai.gov.cn/qtsj/20250610/a1450fd3dda9442c89c874f2cc202e0f.html.

[68] *Id.*

[69] *Id.*

[70] GEN. OFF. OF THE TIANJIN MUN. PEOPLE'S GOV'T [天津市人民政府办公厅], *Notice on Issuing Several Policy Measures for Promoting the High-Quality Development of Manufacturing in Tianjin* [天印发天津市推动制造业高质量发展若干政策措施的通知], Jin Zheng Ban Gui [2023] No. 4 [津政办规〔2023]4 号] (Apr. 11, 2023), TIANJIN MUN. GOV'T (Apr. 18, 2023), https://web.archive.org/web/20260803211957/https://www.tj.gov.cn/zwgk/szfwj/tjsrmzfbgt/202304/t20230418_6209201.html?eqid=a&.

[71] *Id.*

[72] Xinhua, *Airbus Delivers 1st China-Assembled A320 Jet*, CONSULATE-GEN. OF THE PEOPLE'S REPUBLIC OF CHINA IN CAPE TOWN (June 24, 2009), https://capetown.china-consulate.gov.cn/eng/xwdt/200906/t20090624_6965415.htm.

[73] *Id.* (aero-engines and gas turbines [航空发动机及燃气轮机]; *see also* Kennedy, *supra* note 62 (noting the C919's reliance on the CFM LEAP-1C and the CJ-1000A development effort).

[74] Jon Ostrower, *U.S. Engine and Component Ban Poised to Cripple China's Commercial Aircraft Manufacturing*, THE AIR CURRENT (June 6, 2025), https://theaircurrent.com/china/us-china-jetliner-restrictions-ge-rtx-honeywell-comac/.

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