Picking Winners or Propping Up Losers? The Challenges of Chinese Industrial Policy

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1. Introduction: New Challenger, Old Challenges

Chinese industrial policy has been regarded as a major political issue and a major policy challenge by China's Western trading partners. China's immense size and historically rapid growth, China's more temporally distant but still influential heritage as a former Soviet-style planned economy, the differences between its political regime and those of the West, and the growing direct foreign policy conflicts between China and the leading economies of the West give the current debate important features that may indeed have little precedent. On the other hand, controversy surrounding the industrial policies of a rapidly growing Asian trading partner is not new. To economists of a certain age, there are strong echoes between today's policy debates concerning China and those that erupted concerning Japanese industrial policy in the 1980s and early 1990s (Vogel, 1979; Johnson, 1982; Prestowitz, 1986). This essay will seek to be appropriately mindful of the differences, while also leveraging what was learned from the older economic literature that developed in response to the alleged industrial policy successors of China's East Asian predecessors on the path to rapid economic growth, industrialization, and conspicuous success as exporters of manufactured goods (Saxonhouse, 1983; Beason and Weinstein, 1996).

The strategic trade literature of the 1980s and the growth-and-trade literature of the late 1980s and early-to-mid 1990s were, to a certain extent, inspired by the widespread belief that temporary Japanese market intervention had allowed Japan to take a lasting lead in technologically dynamic industries (Krugman, 1990). In their efforts to construct rigorous models that generated these kinds of outcomes, international economists were led to relax long-held assumptions about market power, economic rents, returns to scale, and knowledge

spillovers (Grossman and Helpman, 1991). On the other hand, this generation of theorists carefully identified conditions under which industrial policy would be challenged to generate socially beneficial outcomes, and some of these insights remain very salient today (Eaton and Grossman, 1986). A smaller, but still influential empirical literature of roughly the same vintage sought to examine the efficacy of industrial policy in these earlier Asian contexts, and produced results that are relevant for the current controversy.

This essay will stress five major themes regarding the evolution of Chinese industrial policy. The first is that the Chinese central government has consistently maintained the goal of guiding China's industrial evolution at the industry level. Even as markets were given increased latitude to determine prices, output levels, and employment outcomes *within* industries, official policy documents continued to emphasize the decisive role of state plans in determining long-run outcomes *across* industries.

The second theme is that the Chinese government has retained considerable power over the allocation of key inputs throughout the "reform" era. In principle, this gives the Chinese government far greater ability to shape the economic outcomes it wants to influence than most Western governments have.

However, the usual principal-agent problems obtain, and this is the third theme. Chinese government officials are often not able to precisely measure the attributes they wish to target. Regional governments and firms respond opportunistically to this lack of direct observability, often frustrating the central government's plans.

In the early stages of economic reform, one could argue that the economic impact of the policies and challenges stressed in our first three themes was second-order. The dominant direction of Chinese economic policy was toward greater liberalization than had existed under Maoism, and economic growth expanded as this greater freedom was implemented (Lardy, 2014). One can imagine the overall evolution of "industrial policy" as following a

"U-shape." From the late seventies through the early 2000s, the impact of extensive economic liberalization *within* industries generated growth in output and productivity even as the government continued to intervene (or seek to intervene) in the allocation of resources *across* industries. And, at a time when every sector of the Chinese economy was starved of capital, technology, and skilled managers, ongoing efforts to influence the flow of inputs across sectors was not much of an impediment to growth. As the low-hanging fruit of microeconomic liberalization within industries was harvested in the 1980s, 1990s, and early 2000s, however, the enduring – and in some ways, increasingly ambitious – effort to intervene in the allocation of resources across industries became more important, and, potentially, more harmful (Lardy, 2019).[1]

The fourth theme stresses the growing gap between the Chinese government's ambitions in technological innovations and its capabilities of realizing these ambitions. As the technological ambition of Chinese industrial policy has grown, the difficulty of targeting and measuring outcomes has grown, and the scope for opportunistic behavior by firms and local governments has expanded. The Chinese government no longer seeks to merely replicate capabilities that have long existed elsewhere – it now seeks to create capabilities that do not exist anywhere. What is challenging for even the world's most gifted venture capitalists is likely to be challenging for government officials.

The fifth theme stresses another difficult tradeoff that complicates industrial policy everywhere – the coexistence of multiple objectives. On the one hand, the Chinese government seeks to promote the emergence of new, potentially disruptive technologies and capabilities. At the same time, the government seeks to promote political, social, and economic *stability*. These two objectives often come into conflict. In general equilibrium,

[1] Lardy (2019) also emphasizes an increased effort to tilt the playing field in favor of state-owned enterprises within sectors, that grew more intense over the course of the 2010s.

any attempt to tilt the playing field in favor of one sector de-prioritizes others. When governments are trying to promote and mitigate disruption at the same time, policy dilemmas can ensue.

2. The Origin of Chinese Industrial Policy

China's industrial policy was influenced by the Japanese experience, but also grew out of the traditional economic management tools of a Soviet-style planned economy. As a result, Chinese industrial policy has been characterized by a far greater degree of government intervention and control than Japan's industrial policy.

In December 1978, China began its reform and opening-up policy.[2] At this time, Japan's post-war economic development achievements attracted attention from Chinese scholars and the Chinese government. They believed the Japanese government's active intervention through industrial policies was the key to creating the "Japanese miracle."[3] In response, the Development Research Center of the State Council (DRC), the official think tank of the State Council, organized a series of studies on industrial policy issues from 1985 to 1987 and visited the Ministry of International Trade and Industry in Japan. Based on this research, DRC wrote a research report entitled "Preliminary Study on China's Industrial Policy," and submitted it to the then-leaders of the Chinese Communist Party in March 1987, who quickly approved and instructed the State Planning

[2] A large literature covers this impressive opening and reform. For one influential and comprehensive study, see Naughton (1995).

[3] Chinese government officials were hardly alone in their enthusiasm for the alleged efficacy of Japanese industrial policy. See Vogel (1979), Johnson (1982), and Prestowitz (1986) for examples of influential endorsements of Japanese industrial policy as a cure for America's economic ills.

Commission, which was then the central agency of the planned economy, to implement Japanese-like industrial policy in China (Wu, Hatta, and Chen 2016). After two years of preparation, the State Council issued its own report, "Decision of the State Council on Key Points of Current Industrial Policies" (国务院关于当前产业要点的决定) in March 1989, which was China's first industrial policy document (Jiang and Li 2021).

The "Decision of the State Council on Key Points of Current Industrial Policies" made clear that the Chinese government would not surrender China's industrial evolution to the interplay of market forces. While the importance of enterprise-level and commodity-level economic planning would fade, as the Chinese government increasingly allowed markets to determine prices, factor costs, and output levels within industries, and as it allowed non-state firms to play an increasingly important role in industrial output, the State Council remained determined to guide Chinese growth at the more aggregated industry level. It established an explicit development sequence of industries. As an attachment to the policy document, the "Directory of Current Industrial Development Sequence" (当前的产业发展序列目录) specifically designated key supported, strictly restricted, and prohibited industries and products (and processes).

This explicit designation of industries into these three categories set an important precedent followed in later policies such as "Catalogs for Guiding Industry Restructuring" (产业结构调整指导目录), which have remained in force until today. Three versions of the "Catalog" have been issued in the relatively recent past: the 2005 version, the 2011 version, and the 2019 version. All continued the practice of explicitly designating industries for significant expansion, restricted growth, or decline/elimination. For the restricted sub-industries, new construction is prohibited and for the eliminated sub-industries, new investment is strictly prohibited and firms are asked to wind down their existing activities..

3. The Evolution of Chinese Industrial Policy

In 1993, the Third Plenary Session of the 14th Central Committee of the Communist Party of China passed the " Decision of the Central Committee of the Communist Party of China on Some Issues concerning the Improvement of the Socialist Market Economy" (中共中央关于建立社会主义市场经济体制若干问题的决定),which marked the beginning of the so called "socialist market economic system" reform in China.[4] The reform aimed to make the market play a fundamental role in resource allocation under the macro-control of the state. At the same time, China began serious diplomatic efforts to join the World Trade Organization (WTO). In April 1994, the State Council

[4] 1993 was a pivotal year. After the political upheaval of July 1989, economic reform dramatically slowed. In his final act as the country's paramount leader, Deng Xiao-Ping undertook his famous "journey to the South," visiting the parts of China that has opened up the most, and placing all of his remaining political capital behind an effort to jump-start market-oriented economic reform. By late 1993, it was clear this effort had succeeded.

issued the "Outline of National Industrial Policy in the 1990s" (90年代国家产业政策纲要), which was the first market-based industrial policy promulgated in China (Jiang and Li 2021).

Subsequently, China issued a series of industry-specific industrial policies targeting a wide range of industries, including automobiles, steel, cement, coal, aluminum, electric power, ships, and textiles (Wu, Hatta, and Chen 2016). Some of these policies are actually the initial forms of the policies that draw international attention or spark disputes today. Examples of these policies include the "Automobile Industry Industrial Policy" (1994) (汽车工业), the "Guidelines for Current Priorities for Development in Key Sectors of Hi-Tech Industry" (1999 edition, 2001 edition) (当前优先发展的高技术产业化重点领域指南), and "Several Policies on Encouraging the Development of the Software Industry and the Integrated Circuit Industry" (2000)(鼓励软件产业和集成电路产业发展的若干政策).

During this period, China also began to clean up and standardize its policies on foreign investment in preparation for joining the WTO. In 1995, the Chinese government issued the "Catalog for the Guidance of Foreign Investment Industries (1995 edition)"(外商投资产业指导目录), which again divided industries into three categories: encouraged, restricted, and prohibited. The catalog eventually became today's "Catalog of Encouraged Industries for Foreign Investment" (鼓励外商投资产业目录) and

“Special Administrative Measures (Negative List) for Foreign Investment Access”(外商投资准入特别管理措施 （负面清单）).

The "Outline of National Industrial Policy in the 1990s" set the tone for China's later industrial policies in many ways. Starting with this document, strict Soviet-style commanding economic policy management measures gradually withdrew from the stage. However, the “Outline” also, to a great extent, established a tradition of government implementing microeconomic industrial policy interventions in the name of "macro-control" (Wu, Hatta, and Chen 2016).

China's accession to the World Trade Organization (WTO) in 2001 accelerated the country's opening-up process. In 2004, the State Council issued the “Decision of the State Council on Reforming the Investment System” (国务院关于投资体制改革的决定). The “Decision”, for the first time, clearly stated that for projects that do not use government investment for construction, “examination and approval” (审批制)would no longer need; instead, the government would use “approval”(核准制) and “registration and recording” (备案制).[5] Based on the Decision, the National Development and Reform Commission (NDRC), the successor of the Soviet-style State Planning Commission, formulated the "Interim Measures for the Approval of Enterprise Investment Projects" (企业投资项目核准暂行办法

[5] In an examination and approval system, generally, one project must be examined by the government and get its approval three times: for the “project proposal,” for the “project feasibility study report,” and for the “project commencement report.” In an authorization system, only the “project application report” needs to be approved by the government. In the “registration and recording” system, firms only need to fill in a registration form and fulfill the information disclosure obligation.

) and gave itself significant discretion in approving investment projects (Jiang and Li 2021). Because of this arrangement, NDRC continued its central role in China's economic policymaking into the 2020s.

4. The New Era of Chinese Industrial Policy: The Beginning of Innovation-Focused Industrial Policy

In early 2006, China's State Council, released the "National Medium and Long-Term Plan for the Development of Science and Technology (2006-2020)" (MLP) (国家中长期科学规划). It outlined the scientific and technological priorities, goals, and strategies required to turn China into an innovation-oriented country and one of the world's scientific powers over the years 2006-2020. The MLP laid the foundation for the emergence of a comprehensive system of industrial policies.

The MLP was followed by an implementation document that assigned specific objectives to various bureaucratic agencies. The State Council published a document with 99 policy initiatives and assigned a head agency for each. Most implementation responsibilities were given to economic ministries, with the NDRC receiving 29 and the Ministry of Finance (MOF) receiving 25. The MLP involved a full range of policy instruments to support innovation, including direct government funding, subsidized lending, tax credits for R&D, and cheap land (Naughton 2021). It set clear targets and fulfillment timelines for key innovation metrics (Table 1), and provided financial backing for sixteen Megaprojects covering a wide range of industries (Table 2) (Sun and Cao 2021; Naughton 2021). The aim of megaprojects was to break technological bottlenecks and promote the growth of a competitive industry, while fostering innovative capabilities in sectors that have a significant

influence on both economic and social progress. The MLP officially launched China's nowadays-well-known "indigenous innovation" strategy and, to a great extent, it was the starting point of China's innovation focused industrial and innovation policies. A recent study suggests that while some integrated Megaprojects, such as the development of large passenger aircraft, have made substantial progress, others that involved the private sector and lacked clearly defined goals have been less successful (Sun and Cao 2021).

Table 1: The Targets set in MLP and Their Fulfillment

Indicators	MLP target	Fulfillment (year)
GERD/GDP	2.5%	2.40% (2020)
Contribution of S&T progress (STP)[6]	60%	59.5% (2019)
Dependence of foreign technology (DFT)[7]	Below 30%	31.20% (2016)
Invention patents granted to Chinese citizens	Top 5	3 (2018)
Citations to Chinese-authored papers	Top 5	2 (2018)

Source: recreated from Sun and Cao (2021) Table 1.

Table 2: Overview of the 16 MLP Megaprojects

Project Name	Sector	Project Goals	Total Funding
Core electronics, high-end general microchips, and basic software	Civilian	Develop high-end communication microchips, basic software, and core electronic components Total	100 billion RMB or about 14 billion USD (estimated)
ULSI manufacturing technology Next	Civilian	Industrialize the 90 nm ULSI, produce sample machinery for the 60nm ULSI and acquire key technologies in making the 45 nm ULSI	18 billion or about 2.6 billion USD

[6]Calculated based productivity estimation. Essentially is the ratio of TFP and GDP growth.

[7]Calculated as Total technology import expense/(Total technology import expense +GERD). In 2016, the Chinese government stopped using the degree of dependence upon foreign technology, a pure Chinese creation, on its misleading nature (Sun and Cao 2021).

Next generation broadband wireless mobile communication	Civilian	1. Upgrade technologies of the current cellular mobile communication system, including high-speed packet access (hspa), i.e., 4g; 2. Develop Broadband wireless access technology, including WiMax; 3. Develop a short-distance wireless system and censor network	70 billion RMB or about 10 billion USD
High-end CNC machine tools and basic manufacturing technology	Civilian	Improve China's manufacturing abilities of high-end machinery: e.g., high- precision machinery for aviation, space, shipbuilding, and other industries	21 billion RMB or about 3 billion USD
Large-layer oil and gas fields and coal-bed methane development Large-scale	Civilian	Develop exploration and mining technologies for oil, gas, and coal-bed methane resources under complex geological conditions in Western China	60 billion RMB or about 8.6 billion USD
Large-scale advanced pressurized water reactor (PWR) nuclear power plant and high temperature reactor (HTR)	Dual-use	Obtain key technologies in PWR and build the first commercial plant; acquire key technologies and build a demonstration plant using HTR	15 billion RMB or about 2.1 billion USD from central government (11.92b RMB or about 1.7 billion USD to PWR; 3b RMB or about 0.4 billion USD to HTR)
Water pollution control and treatment	Civilian	Control and protect pollution, develop water treatment technologies, support coordination of regional water access and ecological planning	30 billion RMB or about 4.3 billion USD (estimated)
Genetic transformation and breeding of new plants	Civilian	Research transgene technologies to develop new pest- resistant breeds of higher quality and productivity	20 billion RMB or about 2.9 billion USD
Research and creation of major new drugs for China	Civilian	Develop 30 to 40 drugs new to Chinese production with market competitiveness and intellectual property protection	55 billion RMB or about 7.9 billion USD (estimated)
Prevention and control of major infectious diseases,	Civilian	Develop new vaccines and treatment methods for infectious diseases such as	Unknown

including HIV/AIDS and Viral Hepatitis		HIV/AIDS and Viral Hepatitis	
High-resolution Earth observation system	Dual-use	Develop an observation system consisting of satellites, aircraft, and stratospheric airships; build ground facilities such as observatories and data centers to enhance self-supply of spatial data	40 billion RMB or about 5.7 billion USD
Large passenger aircraft (C919)	Civilian	Design and build China's first large passenger aircraft C919	200 billion RMB or about 28.6 billion USD (estimated)
Manned space flight and lunar exploration	Dual-use	Implement the Chang'e lunar probe and Shenzhou manned spaceship	Shenzhou budget 39 billion RMB or 5.6 billion USD until 2013
Shenguang Inertial Confined Fusion (ICF)	Defense	Information not released	Unknown
Beidou Navigation System	Defense	Build a navigation network consisting of 30 satellites by 2020 (s&t Daily 2012)	Unknown
Hypersonic Technology Vehicle	Defense	Information not released	Unknown

Source: recreated from Naughton (2021) Table 3.1. We convert RMB amount to USD amount according to exchange rate 7 RMB= 1 USD.

In 2008, China's economy was hit hard by the global financial crisis. In response to the crisis, the State Council approved revitalization plans for the automotive and steel industries in January, 2009. Later, the State Council approved revitalization plans for eight other industries, including textiles, equipment manufacturing, shipbuilding, electronics, petrochemicals, light industry, nonferrous metals, and logistics.

After the global financial crisis, the Chinese continued to view building new domains of international competitive advantage, accelerating the upgrading of industrial structure, and transforming the economic growth mode from one based on inexpensive manufacturing to one based on innovation as its industrial policy priority. In September 2010, the State Council issued the "Decision of the State Council on

Accelerating the Cultivation and Development of Strategic Emerging Industries" (国务院关于加快培育和发展战略新兴产业的决定). This document defined the concept of strategic emerging industries quite broadly and selected seven broad industry categories, including energy conservation and environmental protection, new generation information technology, biotechnology, high-end equipment manufacturing, new energy, new materials, and new energy vehicles, as "strategic emerging industries" (SEIs). The document also provided explicit development targets regarding key products and technologies for the development of these industries. In July 2012, the State Council released the "12th Five-Year Plan for the Development of Strategic Emerging Industries"("十二五"国家战略性新兴产业发展规划).The plan provided a more detailed list of development priorities for the above-mentioned seven strategic emerging industries, including key development areas and directions, main tasks, and major projects. The SEIs had a significant degree of overlap with the previously designated Megaprojects, maintaining a policy continuity over this period (Chen and Naughton 2016).

Since the 18th National Congress of the Communist Party of China, China's industrial policy has been more focused on promoting innovation-driven development and the application of emerging technologies in economic development. Important policies related to innovation-driven development, emerging technologies (industries), and the development of

advanced manufacturing include "Made in China 2025"and several other less well-known programs.

"Made in China 2025" is a comprehensive policy initiative launched with great fanfare in May 2015. Its explicit objective is to transition China from being the "world's factory" that produces low-quality goods towards an "innovation-driven" economy that produces higher-value products and services. The “Notice of the State Council on the Publication of Made in China 2025”, the official announcement document of "Made in China 2025", emphasized the importance of being innovation-driven and outlines a strategic goal of becoming a manufacturing powerhouse in three steps. Similar to the approach taken by MLP and the SEI policy, it targeted ten key industries that overlapped significantly with those designated in the MLP and the SEIs, including (1) next-generation information technology, (2) high-end digital control machine tools and robotics, (3) aerospace and aeronautic equipment, (4) oceanographic engineering equipment and high-technology shipping, (5) advanced rail transportation equipment, (6) energy-efficient and new energy automobiles, (7) electric power equipment, (8) agricultural machinery and equipment, (9) new materials, and (10) bio-pharmaceuticals and high-performance medical equipment.

Then, in May 2016, the CPC Central Committee and the State Council jointly announced the " Outline of the National Strategy of Innovation-Driven Development" (IDDS) (国家创新驱动发展战略纲要), a master plan that laid out a strategy for turning China into an “innovation-driven” economy and integrated various industrial policies into a coherent vision. Around the same time, the SEI plan was also reconfigured to align with the

IDDS and become more operational. This allowed China to adopt a portfolio of industrial policies that were tied together by a shared vision statement (Naughton 2021).

Starting from the MLP, China's industrial policy has seen clear strategic repositioning. The 2006 "megaprojects" of the MLP aimed to replicate existing industrial capabilities in advanced economies, while the Strategic Emerging Industries (SEIs) policy focused on promoting new industries with breakthrough potential. However, these initiatives lacked a coherent internal logic tying them together. In contrast, the IDDS was built around a specific wave of technological change that gives the policy a definite form. It aimed to move China to the technological frontier and become a leading technological and economic power. While the document does not explicitly use this language, the IDDS effectively focuses on "general purpose technologies," and seeks to obtain technological leadership or at least parity with the West in these domains.

Guided by the same logic, the "Outline of the Digital Economy Development Strategy" (数据经济战略) was released by the Chinese government in May 2016, aimed at promoting the development of the digital economy and improving the quality and efficiency of the Chinese economy. It is a guiding document for the development of the digital economy in China. In December 2021, the State Council released the "14th Five-Year Plan Digital Economy Development Plan" ("十四五"数字经济发展规划). In its first sentence, the Plan claims, "the digital economy is the main economic form after the agricultural and industrial economies." It also states in the document, "developing the digital economy is a strategic choice to seize new opportunities from a new round of

technological revolution and industrial transformation." The plan outlines a set of specific goals (Table 3) and strategies for expanding digital infrastructure, boosting digital innovation, and promoting digital transformation across various industries. Some of the key priorities outlined in the Digital Economy Development Plan include: (1) Building a more robust and secure digital infrastructure, including 5G networks, data centers, and other key technologies, (2) supporting the development of emerging technologies such as artificial intelligence, blockchain, and the Internet of Things, (3) encouraging the digital transformation of traditional industries such as manufacturing, finance, and healthcare, and (4) promoting the development of digital services and platforms, such as e-commerce, cloud computing, and digital payments.

Prior to the promulgation of this document, the rapid growth of China's digital economy had arguably occurred without a great deal of attention or emphasis in China's official industrial policy plans, which tended to stress more conventional high-tech manufacturing sectors. Since this document was released, government attention and efforts to direct the future evolution of this sector have grown. At the same time, plans to encourage the development of this sector have often existed in tension with other government priorities concerning control over data flows, media content, and the political influence of nonstate actors. A whole subsector of the Chinese digital economy was suddenly regulated out of existence when the central government decided that the rapid expansion of online tutoring companies was adding to the burden of Chinese parents and families. Whether intended or not, crackdowns like this have created uncertainty and undermined entrepreneurs and investors' enthusiasm, at least in the short term.

Table 3: The Goals set in the "14th Five-Year Plan" Digital Economy Development Plan"

Indicators	2020	2025
Digital economy core industries as a percentage of GDP (%)	7.8	10
Number of active IPv6 users (100 million)	4.6	8
Gigabit broadband users (10 thousand households)	640	6000
Software and information technology service industry size (trillion yuan)	8.16	14
Industrial Internet platform application penetration rate (%)	14.7	45
National online retail sales (trillion yuan)	11.76	17
E-commerce transaction size (trillion yuan)	37.21	46
Real-name users of online government services (100 million)	4	8

Source: Authors' direct translation from the official document.

3. Policy Instruments

Unlike many other countries, where industrial policy is primarily determined by parliament and published in legal form, China's industrial policy is predominantly developed by the administrative system and published in the form of administrative regulations. This occurs at both the central and local government levels, with the regulations taking various forms (Jiang and Li 2021).

In addition, unlike many countries where industrial policies are mainly formulated and implemented by the central government, China's industrial policies are set at three levels: the State Council, central government ministries under the State Council, and policies issued by local governments at all levels. The policies issued by the State Council are generally authoritative and comprehensive documents that focus on long-term, strategic, and systemic issues affecting national economic and industrial development. The policies issued by ministries mainly serve to implement or refine policies issued by the State Council. However, rivalries between ministries and competition for fiscal resources can introduce tensions between the ministries and the center. Local government policies are issued by provinces, cities, counties, or towns, and are based on the upper-level policies issued by the State

Council or the relevant ministries (Branstetter, Li, and Ren 2022). This introduces another set of conflicting objectives – agglomerations of industrial activity in a single center or a few centers may be the most economically efficient outcome, but competition among local governments to attract those agglomerations may complicate their creation.

The various levels of the Chinese government use a broad range of policy instruments to achieve industrial policy goals. Major policy instruments include the following.

Guidance catalogs. Guidance catalogs have long been an important policy tool for China's industrial policies, if not the most important one. The catalogs are used as a reference book for project approval or confirmation, credit acquisition, tax incentives, and land use policies. The way an industry is treated in these catalogs has a strong impact on its ability to access key inputs (Jiang and Li 2021).

Investment approval and market access. In China, firms in many industries require project-level investment approval as a prerequisite for obtaining land (all of which is technically owned by the state) and loans (from state-owned banks) for large projects. The government has also established strict procedures and detailed access conditions related to equipment scale, enterprise scale, technical and economic indicators, as well as environmental and safety regulations. However, solely meeting these conditions as listed on government documents does not guarantee investment approval or market access from individual policymakers, who have significant discretion in making these decisions (Jiang and Li 2021).

Compulsory elimination or shutdown of "outdated production capacity." To promote the structural adjustment of industries suffering from overcapacity and help them overcome their challenges, the Chinese government considers eliminating or shutting down government-defined outdated production capacity to be an essential policy. In theory, this policy goal should be achieved through a comprehensive approach that relies as much as

possible on market mechanisms. However, in reality, the government often issues somewhat arbitrary requirements to "eliminate" excess production capacity of a designated group of firms.[8]

Land policy. In China, the government exerts significant control over the supply of land in what is known as the primary land market, in which land is allocated by leasehold sales by local government officials (Cai, Henderson, and Zhang 2013). This control provides a basis for the government to either support or restrict the development of specific industries and products by regulating the availability of land. As a result, land policy has become an essential tool for implementing industrial policy. Industries that are prioritized by the government are more likely to obtain lands at more favorable prices. The Ministry of Land and Resources (now the Ministry of National Resources) and NDRC have jointly issued two catalogs that are still in effect: the "Catalog of Projects with Restricted Land Use (2012 Edition)" (限制用地项目目录) and the "Catalog of Projects with Prohibited Land Use (2012 Edition)" (禁止用地项目目录). These catalogs clearly stipulate that construction projects listed in the Restricted Catalog must meet the prescribed conditions before land management departments can handle relevant procedures. Construction projects listed in the

[8] For instance, in August 8, 2010, the Ministry of Industry and Information Technology released a list of 2,087 underperforming companies in 18 industrial sectors that must eliminate their outdated production capacity by the end of September that year. See http://www.gov.cn/jrzg/2010-08/08/content_1673696.htm

Prohibited Catalog are not permitted to undergo relevant procedures through land management departments.

Direct subsidies. In China, subsidies are widely used by the government to encourage specific behaviors of firms for a wide range of objectives including expanding business, increasing research and development investments, and supporting technology upgrades and environmental protection (Branstetter, Li, and Ren 2022). Supply-side subsidies provided to firms and demand-side subsidies provided to consumers are both widely used in China to encourage development of targeted industries. Subsidies in China are provided by both the central government and local governments. Branstetter et al. (2022) finds that the subsidy providers involve all hierarchical levels of the Chinese governments, including central, provincial, prefecture, county, township and even village governments.

Tax incentives. China's tax incentive policies mainly include the following types: (1) tax incentives for investment in encouraged industries; (2) tax incentives for encouraging enterprise technology upgrading investment and adoption of advanced equipment; (3) tax incentives for encouraging exports, such as export tax rebate policies for export enterprises; (4) tax incentives for encouraging investment in environmental protection equipment and technology; (5) tax incentives for encouraging R&D (Chen et al., 2021); (6) tax incentives for small and micro enterprises (Jiang and Li 2021). Given strict limitations in the ability of China's subnational governments to impose taxes or change tax law, tax incentives are generally set at the central level.

Policy loans. Policy loans have always been an important tool in China's industrial policy. Policy loans provide credit support for business operations in encouraged industries. China has three official policy banks: the China Development Bank, the Export-Import Bank of China, and the Agricultural Development Bank of China. Of these three, the China Development Bank is the most important. In addition to policy banks, the four major state-

owned commercial banks, the Industrial and Commercial Bank of China, the China Construction Bank, the Agricultural Bank of China, and the Bank of China, are also required to provide credit support for targeted industries and enterprises in accordance with industrial policies.

Government Procurement. China's decision to not accede to the Government Procurement Agreement (GPA) has allowed it to utilize government procurement as a significant tool for industrial policy. One notable example is the support for electronic vehicle (EV) development during the early years, when the Chinese government gave priority to EVs in public procurement to stimulate growth in the EV market. As a result, electric buses and passenger vehicles procured through public channels accounted for approximately 65% of total sales between 2012 and 2015, and around 50% of total EV sales in 2018 (Annual Report on New Energy Vehicle Industry in China, 2018).

Talent Policy. China aims to become a global leader in science and technology and regards talent as crucial to achieving this objective. The country's focus on talent started around the turn of the century when its leaders realized the need to shift from a labor-based export economy to a knowledge-based one. In key sectors such as biotechnology, artificial intelligence, and semiconductors, officials perceive a shortage of highly skilled labor as a significant obstacle to national goals. As a result, China's talent drive received the backing of its most prominent leaders, including the Central Committee of CCP, which stated in its 2016 "National Innovation-Driven Development Strategy" that "the essence of being innovation-driven is being talent-driven." To build up its talent pool, China is pursuing a multi-pronged approach. In addition to enhancing domestic education, the Chinese government also set attracting overseas Chinese talent and drawing in foreign talent in keeping with its industrial policy priorities (Zwetsloot 2020).

Government guidance funds. The Chinese government has employed government guidance funds (政府引导基金) to direct investments into strategic industries and accelerate the development of China's technological leadership on a global scale. These funds are venture-capital-like public-private investment vehicles that operate according to the state's industrial policy objectives, aiming to generate financial returns while also supporting specific government priorities, such as promoting emerging technologies or attracting industry to particular regions (Huang, 2019). Public and private sources contribute to these funds, with limited partners (LPs) investing capital and receiving returns while general partners (GPs) make investment decisions and oversee operations. While private investment is encouraged, these funds are predominantly financed by the government, state-owned enterprises, and financial institutions. By the first quarter of 2020, 1,741 guidance funds had been established by Chinese authorities, with a combined registered target size of 11 trillion RMB (equivalent to 1.55 trillion USD); however, the actual amount raised by these funds was 4.76 trillion RMB (equivalent to 672 billion USD) (Luong, Arnold, and Murphy 2021). Since the turn of the 21st century, government guidance funds have emerged as a crucial mechanism for China to implement its industrial policies, and we

consider their controversial role in the evolution of China's semiconductor industry later in the paper.

5. Does China's Industrial Policy Work? A Selective Review of the Recent Empirical Literature

The effectiveness of China's industrial policy has been a subject of debate among economists and policymakers, with conflicting views and varying research findings. While some studies suggest that industrial policy can promote economic growth and development in China, others question its impact. One possible explanation for these divergent findings is the evolving relationship between China's industrial policy and its economy. While China's initial adoption of a Japanese-style industrial policy from Soviet-style economic management signaled a positive move towards a more market-oriented economy during the early days of reform and opening-up, as the socialist market economy has continued to progress, the heavy-handed intervention of the government has increasingly hindered entrepreneurship and innovation. Furthermore, although government intervention may be effective during the catch-up phase, as China seeks to follow in the footsteps of Japan, South Korea, and Singapore, its ability to use industrial policies to drive innovation-based growth is limited due to the high degree of uncertainty surrounding the technology frontier. Another factor contributing to the mixed results is the challenge of accurately establishing the true "treatment" effect of industrial policy. It is difficult to measure the hypothetical scenario of a no-policy approach.

This section provides an overview of recent research on China's industrial policy. We will review some studies conducted in the past few years to shed light on the current state of research in this area.

Industrial policy and productivity. Branstetter, Li, and Ren (2022) investigate the relationship between the allocation of government subsidies and total productivity (TFP) for

Chinese listed firms. Findings show little evidence that the Chinese government consistently "picks winners". Firms' ex-ante productivity is negatively correlated with subsidies received by firms, and subsidies appear to have a negative impact on firms' ex-post productivity growth throughout the data window, 2007 to 2018. Neither subsidies given out under the name of R&D and innovation promotion nor industrial and equipment upgrading positively affect firms' productivity growth. Howell (2017) analyzes data from Chinese industrial enterprises with a revenue greater than five million RMB from 2001 to 2007, revealing a consistent negative impact of subsidies on TFP across firms of varying technological levels: subsidies have a detrimental effect on TFP regardless of whether the firm is in low-tech, medium-low tech, medium-high tech, or high-tech industries.

Using the data from the China Employer Employee Survey Cheng et al. (2019) reveals that firms with political connections tend to receive a larger share of innovation subsidies. However, these subsidies do not lead to an improvement in the quality of patents or productivity. Mao et al. (2021) conducted a study using industrial-level data from 2005 to 2012 to examine the impact of industrial policies on total factor productivity (TFP). They employed a Regression Difference in Differences approach and found that the effects of industrial policies on TFP varied depending on the industry. Specifically, while industrial policy had a positive effect on "strategic emerging industries," no effects were observed on "domestically mature" or "domestically catching-up" industries at 5% significance level.[9] Du et al. (2023) use Chinese industrial enterprise data from 1998 to 2007 to jointly estimate the direct and indirect effects of government subsidies on subsidized and non-subsidized firms. Their findings suggest that while subsidized firms experience an increase in productivity,

[9] However, the study did not test the parallel trends assumption, which raises concerns about potential selection bias. For instance, it is possible that strategic emerging industries were both more likely to experience productivity growth and receive more industrial policies. Therefore, caution should be exercised when interpreting the findings.

non-subsidized firms operating within a cluster with subsidized firms experience a decrease in their productivity growth, and the negative indirect effect tends to dominate.

The effect of sector-specific industrial policies. Wu, Zhu, and Groenewold (2019) utilize a provincial panel data set that covers 419 four-digit manufacturing industries from 1999 to 2010. They employ a Difference in Differences (DiD) approach to examine the impact of being targeted by the provincial Five-Year Plans on the output of these industries. Their findings indicate that sector-specific industrial policies have a positive effect on industrial output. However, the effect is found to be temporary and does not persist beyond the end of the particular Five-Year Plan. Using more recent data and also employing a DiD approach, Branstetter and Li (2022) examine how the "Made in China 2025" policy initiative has impacted Chinese listed firms' receipt of subsidies, R&D expenditure, patenting, productivity, and profitability. They find that while more innovation promotion subsidies seem to flow into the listed firms targeted by the policy, there is little statistical evidence of productivity improvement or increases in R&D expenditure, patenting and profitability.

Utilizing a complex structural model and comprehensive data on the international shipping sector, Kalouptsidi (2018) *infers* the magnitude of subsidies by monitoring the conduct of subsidized Chinese shipbuilding corporations and find evidence of large cost and production misallocations. Building on this research, Barwick, Kalouptsidi, and Zahur (2019) reach the conclusion that these subsidies led to substantial growth in production and global market share, but only minimal gains in long-term profits, innovation, or favorable spillover effects to other Chinese industries. According to their welfare analysis, the drawbacks of these interventions outweigh the advantages. Barwick, Cao, and Li (2021)and Bai et al. (2020) investigate Chinese industrial policy in the automotive sector, which is now the largest in the world, and find evidence that government intervention has resulted in

significant market distortions, with significant conflicts between national and provincial-level policies.

The effect of innovation promotion industrial policies. Fang et al. (2022) employed the DiD method to investigate the impact of the Chinese anticorruption campaign and unexpected turnover of local government officials on the allocation of R&D subsidies to firms. Their findings suggest that merit played a more significant role in determining the number of R&D subsidies awarded, while corruption had less influence. On the other hand, these results also indicate the existence of significant corruption in the R&D subsidy allocation process at the beginning of their sample period. Gao et al. (2021) conducted a study using government internal data from manufacturing firms in Jiangsu Province to explore the heterogeneous effects of central and local R&D subsidies on firms' exploratory innovation. Their findings indicate that R&D subsidies generally have a positive impact on exploratory innovation, with local subsidies showing a more prominent effect. Additionally, they found that the positive effect of subsidies is even stronger for recipients located in highly specialized industrial agglomerations.

Guo, Guo, and Jiang (2016) utilize data from industrial firms and employed propensity score matching methods to examine the effects of China's Innovation Fund for Small and Medium Technology-based Firms (Innofund), finding a positive impact on patenting, new product sales, and exports. Using the same data and similar methods, these authors discovered that Innofund subsidies generally assist more productive firms and contribute to their *ex post* productivity improvements (Guo, Guo, and Jiang, 2018). However, using Innofund internal administrative data and a regression discontinuity design, Wang, Li, and Furman (2017) find that receiving Innofund grants does *not* increase firm survival, patenting, or venture funding. Using patent application data in China between 1995-2004, Li (2012) empirically examines the impact of provincial patent subsidy programs on firms' patent

behavior and confirms that patent subsidy programs help stimulate patent applications. Long and Wang (2019) analyze Chinese patent data from 1985-2010 and find that patent subsidy policies expanded the number of patent applications and approvals but had a negative impact on the average patent quality, as evidenced by an increase in the patent application withdrawal rate and a decrease in the patent renewal rate.

Many of the microeconometric studies present empirical evidence calling into question the efficacy of certain industrial policies, but make no effort to quantify the implications for the aggregate economy. Cao et al. (2022) break new ground by considering the long-run growth implications of subsidies that target patent quantity (rather than quality). These authors develop a Schumpeterian growth model featuring innovating firms' quantity-quality trade-off between radical and incremental innovations. They calibrate the model to Chinese firm-level data from the early 2010s and show that the quality channel effects are negative and dominant. As a result, quantity-based subsidies in China during that period reduce the TFP growth rate and welfare. Given the widely observed, substantial decline in TFP growth in China in recent years, these results are sobering.

Evidence on firms gaming industrial policies. Chen et al. (2021) showed that in China, companies are reclassifying other expenses as research and development (R&D) expenses in order to obtain R&D subsidies.[10] This might help to explain why there is a significant misallocation of R&D investment in China (König et al. 2022). Stuart and Wang (2016) find additional evidence that firms "cook the books" in order to receive government innovation grants. Dang and Motohashi (2015) analyzed merged data on Chinese patents and industrial firms from 1999-2008 and find that although patent subsidies stimulated the quantity and success rate of patent applications, they also induced firms to strategically apply

[10] Despite this evident gaming of the system, the authors conclude that tax incentives have also led to significant (and possibly welfare-enhancing) increases in R&D.

for low-quality and low-value patents to receive the subsidy. Sun et al. (2021) demonstrate through their study of seasonal variations in patent applications in China from 1994 to 2007 that government patent policies and annual targets, including patent subsidies, have encouraged companies to engage in a conformity game. While these behaviors have increased the number of patents, they have also had a negative impact on patent quality. By utilizing internal data from China's InnoCom program and employing structural econometric models, Wei et al. (2021) show that subsidies actually decrease the value of patents. This is due to either a decline in the quality of newly granted patents or the inefficient trading of patents. As a result, the subsidy return rate is significantly negative and there is a substantial decline in aggregate welfare.

6. Illustrative Case Studies

Before concluding this essay, we offer a condensed description of two industry case studies which illustrate important trends in recent Chinese industrial policy. As examples, we focus on the semiconductor industry and the EV industry.

The "Big Fund": NICIF and the Chinese Semiconductor Industry

Starting from 2005, the Government guidance funds (GGFs) have played a crucial role in China's technological aspirations, serving as a vital tool for its industrial policy. Between 2015 and 2017, the target capital size of GGFs exceeded the total amount of China's direct government financing in science and technology (Wei, Ang, and Jia 2022). However, despite their importance in China's current innovation-focused industrial policy, there has been minimal academic research on the practical impacts of GGFs.[11] To address this gap, we will provide a case study on the National Integrated Circuit Industry Investment Fund (NICIF) (国家集成电路产业投资基金), which is

[11] Two exceptions are Wei, Ang, and Jia (2022) and Luong, Arnold, and Murphy (2021).

commonly referred to as the "Big Fund," to shed light on the effectiveness of GGFs.

The NICIF is one of the most well-known government-guided investment funds in China. It was established in September 2014 after the State Council released the "Outline of the Program for National Integrated Circuit Industry Development" in July of the same year. During its first round of fundraising, the Big Fund raised RMB 138.72 billion (US$20.03 billion), surpassing its target of RMB 120 billion (USD 17.33 billion). The Ministry of Finance is the largest shareholder of the Big Fund, owning 36 percent, while other state-owned enterprises such as China Development Bank Capital Corporation (22 percent), China Tobacco (11 percent), Beijing E-Town International Investment and Development Corporation (10 percent), and China Mobile (5 percent) also hold significant stakes (Huang 2019).[12]

The Big Fund invests in promising semiconductor companies. As of 2019, the majority of NICIIF's investments, approximately 67%, had gone to semiconductor manufacturing companies including some of China's top semiconductor manufacturers such as SMIC and Hua Hong Semiconductor (Table 4), while the remainder to firms specializing in design, materials, packaging, and integrated circuit equipment (Wei, Ang, and Jia 2022). The fund invested RMB 31.3 billion (USD 4.5 billion) in 19 publicly-traded companies listed on the Shanghai, Shenzhen, and Hong Kong stock exchanges, achieving a 125% return on investment from 2014 to 2019 (Wei, Ang, and Jia 2022). It also invested 102.6 RMB billion (USD 15 billion) in 36 unlisted companies (Caixin 2022). Additionally, it is also a significant shareholder in several local government guidance funds, such as the Beijing Integrated Circuit Manufacturing Fund and the Shanghai Integrated Circuit Industry Fund. In October

[12] These are the "LPs" of the fund.

2019, NICIIF initiated the second phase of fundraising, and raised another RMB 204 billion (USD 29.4 billion).

Table 4: The NICIF's chipmaking investments

Company	The Big Fund's stake (%)
Semiconductor Manufacturing International North China (Beijing) Corp	32
Hua Hong Semiconductor (Wuxi) Ltd	29
Yangtze Memory Technology Holdings Co Ltd	24.1
Unisoc (Shanghai) Technologies Co Ltd	14
Empyrean Technology Co Ltd	8.9
Beijing BDStar Navigation Co Ltd	8.6
NAURA Technology Group Co Ltd	7.5
Advanced Micro-Fabrication Equipment Inc China	4
Goodix Technology Inc	3.6
National Silicon Industry Group Co Ltd	2.7

Source: Recreated from White and Liu (2022).

The NICIF had been regarded as a success (Wei, Ang, and Jia 2022), but a recent series of corruption scandals has cast doubt on its ability to allocate resources. In November 2021, Gao Songtao, the former vice president of Sino IC Capital (i.e., the GP of the Big Fund), a subsidiary of China Development Bank that managed the national chip fund, was arrested for corruption. In July of 2022, a new round of arrests began with the investigation into Lu Jun, the former president of Sino IC Capital. In mid-July, Zhao Weiguo, the former chairperson of Tsinghua Unigroup, was taken away by police from his home in Beijing. Then Ding Wenwu, the former president of the Big Fund, was also detained by police. During the year of 2022, a dozen chip executives, fund managers and government officials related to the Big Fund were detained or arrested. Although there hasn't been any official explanation for the link between the detentions of Gao, Lu, and Zhao, speculation has arisen due to the Big Fund's significant investments in Tsinghua Unigroup. In the first phase of the Big Fund, Tsinghua Unigroup was one of the biggest investees of the fund, receiving at least RMB 28.4 billion from the Big Fund. Tsinghua Unigroup, known as China's "microchip aircraft carrier," has been in trouble

since July 2021, when it announced that it could not repay some of its large debts. Zhao Weiguo was officially charged with “seizing state assets” in March 2023.

While it is ideal for Government Guided Funds (GGFs) to adhere to market rules, in reality, state partners tend to meddle in the investment decisions and operations of VC firms. According to a survey by Zero2IPO, government fiscal departments or state asset supervisory bodies served as observers for 31 percent of the surveyed GGFs, while 29 percent had them play the role of final approvers, and 25 percent included them in investment committees (Wei, Ang, and Jia 2022). This combination of significant capital, extensive state intervention, and insufficient transparency creates an environment where corruption is likely to occur.

Industrial policy and the rise of the Chinese electric vehicle industry

The success of the Chinese electric vehicle (EV) industry by far is often seen as a tale of both catching up and effective industrial policies (Xiong et al. 2022). Undoubtedly, industrial policies have played a significant role in creating this industry. However, we argue that the industry's key to success lies in policies that provide consumers with a choice for EV purchases. Such policies have fostered market competition among EV makers, forcing them to innovate, improve car quality, and continually reduce costs.

China's ambition in the electric vehicle (EV) industry started earlier than many might thought. Back in 1992, Xuesen Qian (Hsue-Shen Tsien), a highly influential Chinese scientist, advised Jiahua Zou, the Vice Prime Minister at the time, to formulate a plan to support EV development "immediately." Policy makers quickly heeded Qian's suggestion by launching the country's first national pilot EV research and development project, which continues to this day. China also began promoting the industrialization of EVs during the 10th five-year plan (2001-2005). In 2001, it established the first national EV operation, test,

and demonstration zone in Guangdong Province. By 2005, Chinese firms had already developed prototypes of fuel cell vehicles and hybrid electric vehicles.

In 2009, China emphasized for the first time that the industry should focus on EVs "to strengthen independent innovation, cultivate independent brands, and form new competitive advantages" in the Plan on Adjusting and Revitalizing the Auto Industry. However, focusing on EVs meant a shift in focus for makers of internal combustion engine vehicles to the EV sector, which was challenging as the EV market was virtually non-existent. In 2009, while Chinese consumers purchased over 13.5 million passenger vehicles, only 319 of these were EVs.

To stimulate the market for EVs, the Chinese government introduced a series of policies. The main policy, which is well-known internationally, was to provide customers with financial incentives to buy EVs, including consumer subsidies, exemption from purchase tax, and free license plates. However, what is less known to non-Chinese audiences is that the government also gradually reduced the amounts of subsidies over time to avoid the firms becoming overly reliant on these policies. As shown in Table 5, subsidies for EV models in each category decreased over the years. The maximum subsidy amount decreased from 60,000 RMB (approximately 8,500 USD) in 2013 to only 12,600 RMB (approximately 1,800 USD) in 2022. In addition to reducing subsidy amounts, the Chinese government also tied EV subsidies to their electric ranges, providing higher subsidies for models with longer ranges. This incentivized firms to move up the stepwise range levels through innovation, as higher levels were associated with higher per-km subsidies. As the government continuously increased the range requirement for subsidies, the electric range of EVs sold in China also increased rapidly.

The Chinese central government aimed to make policies clear and predictable for firms as they promulgated and adjusted policies. When designing the subsidy programs, the

government established different subsidy standards for different periods. However, it also ensured that the subsidy program for the next period was publicized around six months before the current period ended. For major policy changes, the Chinese government sent signals to the market years in advance. For example, the government informed EV makers in 2016 that all EV subsidies would be canceled in 2020 (this was then extended to 2022 due to COVID-19).

Table 5: **The subsidies for EVs provided by the Chinese central government from 2013 to 2022** (unit: 1,000 RMB).

Minimum electric range for subsidy eligibility	50 KM (PHEV)	80 KM (BEV)	100 KM (BEV)	150 KM (BEV)	200 KM (BEV)	250 KM (BEV)	300 KM (BEV)	400 KM (BEV)
2013/1/1-2013/12/31	35	35	35	50	50	60	60	60
2014/1/1-2014/12/31	33.25	33.25	33.25	47.5	47.5	57	57	57
2015/1/1-2015/12/31	31.5	31.5	31.5	45	45	54	54	54
2016/1/1-2017/12/31	30		25	45	45	55	55	55
2017/1/1-2018/2/11	24		20	36	36	44	44	44
2018/2/12-2018/6/11 (transition period)	16.8		14	25.2	25.2	30.8	30.8	30.8
2018/6/12-2019/3/25	22			15	24	34	45	50
2019/3/26-2019/6/25 (transition period)	13.2			1.5	2.4	20.4	27	30
2019.6.26-2020/4/22	10					18	18	25
2020/4/23-2020/7/22 (transition period)	8.5					9	16.2	22.5
2020/7/23-2020/12/31	8.5						16.2	22.5
2021/1/1-2021/12/31	6.8						13	18
2022/1/1-2022/12/31	4.8						9.1	12.6

Source: Compiled by authors from various government documents.

The Chinese government also invested in building infrastructure for EVs, particularly charging points. From 2013, the central government started providing subsidies to cities to

incentivize the construction of charging points. It established a threshold for the total amount of such subsidies,[13] increasing from 125 million RMB (approximately 18 million USD) in 2013 to 600 million RMB (approximately 86 million USD) in 2020.

In 2017, the Chinese government implemented the dual-credit system, which combined the corporate average fuel consumption credit and the new energy vehicle credit. Automakers who exceeded the fuel consumption threshold set by the government received negative credits, and needed to offset them with positive NEV-credits or face penalties. This created an incentive for ICEV makers to enter the EV sector or cooperate with EV firms, as they struggled to meet the fuel consumption goals set by the government.

The Chinese government gradually introduced more market competition into the EV sector as it grew. In 2016, wholly foreign-owned companies were allowed to manufacture EV batteries in certain free trade zones, and in 2018, they were permitted to manufacture EVs as well. This led to Tesla building a Gigafactory in Shanghai and delivering Model 3 from the factory in January 2020.

Although Tesla has seen rapid sales growth in China since 2020, its impact on its major Chinese competitor BYD has been only temporary, as shown in Figure 1.

[13] The real spending is unclear.

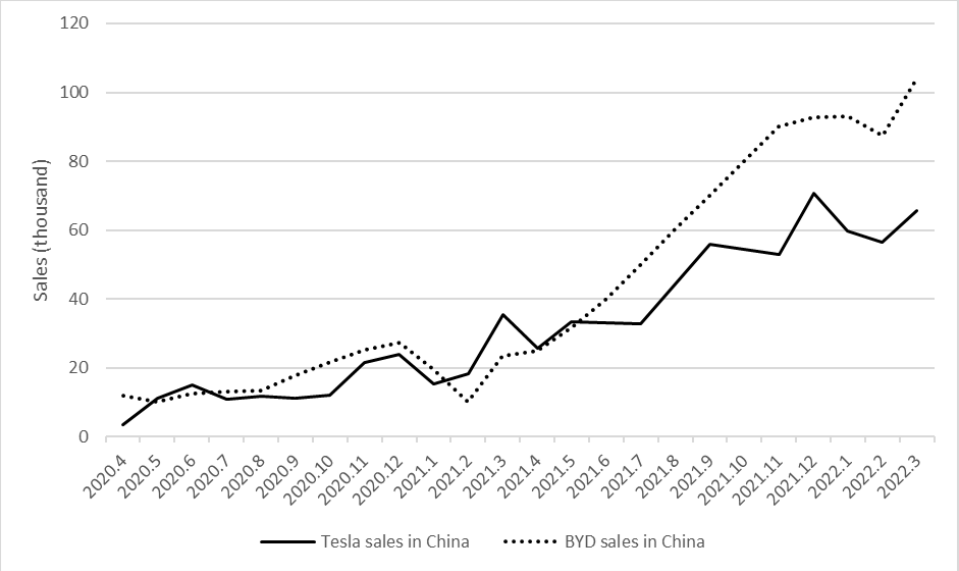


Fig. 1. Monthly EV sales for Tesla and BYD in China.

To summarize, despite the high costs[14] and instances of fraud[15] associated with EV industrial policies, the evidence suggests that overall the benefits of government intervention to date seem to outweigh the costs.(e.g. Blaschke, 2022; Helveston et al., 2019). In this case, the most important components of the subsidy were provided to consumers who were free to select the best product, regardless of the identity of the producer. This allowed the market to pick the winner rather than government policymakers. This presents a sharp contrast with the prior case, in which government-linked investment funds literally "picked winners."

7. Conclusion

Chinese industrial policy has increasingly attracted attention, foreign criticism, and significant policy reactions from key trading partners. However, the policy debate has been inadequately informed by research. This essay provides an historical perspective on the long evolution of Chinese industrial policy and provides a summary of the still limited but growing literature on the efficacy and impact of Chinese industrial policy.

[14] We estimate the total amount of subsidies given out by the Chinese central government from 2010-2019 is 95 billion RMB, or about 13.6 billion USD.

[15]For example, between 2016 and 2017, the Ministry of Industry and Information Technology exposed 11 new energy vehicle companies for cheating on subsidies. http://auto.sina.com.cn/news/ct/2017-02-13/detail-ifyamkzq1268622.shtml

To put it simply, industrial policy is hard for any nation that has attempted it. The challenges that have arisen for China's predecessors are clearly evident in its policy history and in the empirical assessments of that history. Sometimes, policymakers seem to get industrial policy "right." Often, they get it wrong. This is not because Chinese policymakers are especially bad – it is because industrial policy is hard, even in a political context where the impact of conventional interest group lobbying might appear to be limited. The evidentiary picture of China's success that emerges from the extant empirical literature is, at best, mixed.

Our assessment in this essay is that industrial policy is going to get harder as China's economy continues to mature and the long-lasting boost to economic growth generated by earlier waves of economic liberalization and demographic dividends continue to fade. The gap between policy ambitions and capabilities is likely to grow. The conflicts generated by competing policy objectives are likely to intensify. The challenge of managing the opportunistic reactions of regions, firms, and other "players" in the industrial policy game is likely to become more difficult to manage. Finally, the opportunity cost of policy errors is likely to grow. None of this is unique to China. However, China's size and central role in the global economy suggest that the resolution of these challenges will have significant global impact.

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