

Working Paper for the Penn Project on the Future of U.S.-China Relations

Learning from China's Strategy for Activating the Economic Power of Data

Kendra Schaefer, Trivium China

In recent years, U.S. data policy has focused heavily on defensive and reactive securitization, with too little emphasis on defining a forward-looking, growth-oriented data strategy. Meanwhile, China has developed a well-articulated data strategy designed to harness the power of data to bolster economic growth and AI competitiveness, and is in the process of updating its legal, regulatory, and financial systems in support of that strategy. To respond to this challenge, the United States should complement its security agenda with proactive policies that position it to better understand and leverage the economic power of data.

Introduction

Countries which invest in increasing the supply of high-quality data, and enacting policies that support access to and utilization of data, stand to realize substantial benefits. Research increasingly suggests that boosting data availability and circulation can act as a key driver of economic growth by improving decision-making, driving job creation and innovation, and underpinning more efficient allocation of resources.¹ This is doubly true in the AI era, where realizing the full spectrum of AI's benefits hinges in part on access to large, specialized datasets.

Over the last half-decade, China has articulated a proactive, cohesive, and ambitious data strategy to harness the power of data for economic growth. As this paper will describe, China's data strategy is a whole-of-government effort that seeks to create a market environment in which companies, government bodies, and researchers are incentivized to generate, sell, share, utilize, and profit from data. To this end, China is systematically formulating laws, releasing policies, funding research, and running pilot initiatives designed to increase the amount of high-quality data available on the market, and increase the efficiency with which data is traded among market actors. To do this, the state is actively addressing a range of fundamental, system-level challenges that it views as barriers to data circulation and constraints on the expansion of data supply. This paper will examine those challenges as Beijing understands them and provide a brief overview of the solutions China is currently pursuing.

Although China's data strategy encompasses many different components, it is predicated on a single core premise: that in the digital age, data has become a "factor of production"—a critical input to the creation of economic value. In other words, at the heart of Beijing's data strategy is the theory that in order for companies and governments to generate value and growth, they need a steady supply of high-quality data, just as they also need a steady supply of traditional production factors like raw materials, workers, and capital. In Beijing's view, it then follows that it is the state's responsibility to ensure ongoing data supply and to optimize access to high-quality data. Chinese policymakers have coined the term "data factors" (数据要素)—or "data as a factor of production"—to describe this idea.

¹ Mitchell, John, Daniel Ker, and Molly Leshner. 2021. "Measuring the Economic Value of Data," *OECD Going Digital Toolkit Notes* 20. <https://doi.org/10.1787/f46b3691-en>.

Working Paper for the Penn Project on the Future of U.S.-China Relations

Meanwhile, the United States has largely failed to formulate a coherent, intentional, and competitive national strategy for turning data into a true economic driver. U.S. policymaker discourse on data competitiveness is narrowly framed around the risk of data theft by entities from countries of concern and the need to prevent it. While protecting access to the sensitive personal data of U.S. citizens is important and necessary, a wholly defensive and reactive posture cannot substitute for a proactive strategy to cultivate domestic data value, incentivize innovation, and position the United States as a leader in the AI era.

Not only has the U.S. failed to formulate a strategy of its own, but Washington has also miscast China's data strategy as little more than an effort to control data flows solely for the sake of social or geopolitical control. This framing is unhelpful, as it obscures the economic logic driving Beijing's policies and risks leaving the United States without a reasoned response. As such, this paper will seek to provide a brief overview of Beijing's strategy to leverage data for economic gain, how it is seeking to remove barriers to data supply and circulation, and will additionally encourage U.S. policymakers to articulate an intentional vision for leveraging data to support both economic growth and AI competitiveness.

Data as a Factor of Production

A growing body of economic research suggests that economies that expand the supply of high-quality data, enable its efficient flow, and encourage its wide application can unlock a multitude of benefits, including boosting GDP growth. A 2019 study by the OECD concluded that “data access and sharing can help generate social and economic benefits worth between 0.1% and 1.5% of gross domestic product (GDP) in the case of public-sector data, and between 1% and 2.5% of GDP ([or in some cases] up to 4% of GDP) when also including private-sector data.”² In part, that is because increased data supply can create jobs, as innovators leverage available data to create new businesses and business models. In 2017, Deloitte reported that the London transport authority's decision to release real-time transport data through open APIs enabled the creation of more than 600 third-party apps, directly supporting over 500 high-productivity jobs, and resulting in economic benefits and savings of an estimated GBP 130 million.³ It is not just public sector data sharing that generates such gains; there is also evidence indicating that increased data collection and application by private firms can increase labor productivity. A July 2025 paper published by the National Bureau of Economic Research finds that when companies invest in collecting and utilizing proprietary data, labor productivity can be boosted at approximately 0.2% per year.⁴ Increased data flow has further economic benefits in the sense that it can underpin more efficient resource allocation decisions. For example, multiple papers on agricultural technology describe how data-driven AI analysis tools are helping farmers make better-informed decisions about planting schedules, soil management, and harvesting, maximizing yields while minimizing losses,

² Organisation for Economic Co-operation and Development (OECD). 2019. “Enhancing Access to and Sharing of Data: Reconciling Risks and Benefits for Data Re-use Across Societies.” OECD, November 26. <https://doi.org/10.1787/276aaca8-en>.

³ Deloitte. 2017. “Accessing the Value of TfL's Open Data and Digital Partnerships.” Deloitte, July. <https://content.tfl.gov.uk/deloitte-report-tfl-open-data.pdf>.

⁴ Corrado, Carol, et al. 2024. “Data, Intangible Capital, and Productivity.” In *Technology, Productivity, and Economic Growth*. University of Chicago Press: Chapter 7. <https://www.nber.org/books-and-chapters/technology-productivity-and-economic-growth/data-intangible-capital-and-productivity>.

Working Paper for the Penn Project on the Future of U.S.-China Relations

with benefits that accrue across the entire food system.⁵ Finally, it has been suggested that the more data is shared, the more these benefits compound. According to research by the OECD, when multiple datasets across topical domains are linked together, companies and organizations can benefit from “super-additive” insights, in which the value of combined data is significantly greater than a single data set or source alone.⁶

Despite these indications that data, when widely shared and utilized, can have positive economic impacts, data’s true contribution to economic growth is still only somewhat understood, and is “only partially captured in the macroeconomic statistics.”⁷ That’s because traditional economic measurement systems were designed to track tangible goods and services, and are poorly suited to valuing intangible assets like data. As a result, much of the productivity growth, innovation, and efficiency gains enabled by data appear indirectly, or not at all, in standard economic indicators. Economists therefore continue to debate exactly how data contributes to productivity, and how to model and measure that contribution. As such, data’s contribution to growth is likely systematically undercounted, complicating efforts to design policies that fully harness its potential.

Yet despite a lack of global consensus regarding how data interacts with the economy, Chinese policymakers have already forged their own working consensus on data’s economic function—a consensus that places data supply and circulation at the core of China’s macroeconomic strategy. In April 2020, the State Council released a landmark macroeconomic document titled, “Opinions on Improving the Mechanisms for Market-based Allocation of Production Factors (below “Opinions”).”⁸ Put simply, the “Opinions” address barriers that the state believes are preventing market actors from accessing and using traditional production factors needed to create economic value, like land, labor, capital. They then encourage lower-level government bodies to release policies that reduce or remove those barriers. For example, the “Opinions” call on lower-level policymakers to make it easier for companies and investors to access and leverage capital by “reforming and improving the stock market issuance, trading, and delisting systems.” But what makes this document truly notable is that the “Opinions” not only address barriers to the circulation of traditional factors of production, they also address barriers preventing companies from accessing and using what the state calls “data factors” (数据要素), or “data when leveraged as a factor of production.”

The implication of designating data as a factor of production is that, just as natural resources, human resources, and capital resources are necessary for economic value creation, so too is data a necessary raw material of the modern economy; and, just as policymakers are expected to formulate initiatives, regulations, and laws that make it both safe and convenient for companies

⁵ Nachappa, MN. 2023. *A Fundamental Study of Digital Agriculture*. Alexis Press, October. <https://alexispress.in/wp-content/uploads/2023/10/A-Fundamental-Study-of-Digital-Agriculture.pdf#page=42>.

⁶ OECD. 2019, “Enhancing Access to and Sharing of Data.”

⁷ Corrado, Carol, et al. 2022. “Data, Intangible Capital, and Productivity.” Paper prepared for the NBER/CRIW Conference on Technology, Productivity, and Economic Growth, March 8. <https://www.imf.org/-/media/files/news/seminars/2022/10th-stats-forum/session-iv-10th-statforum-carol-corrado-et-al-criw-data-and-productivity-8mar22-for-imf.pdf>.

⁸ 「中共中央 国务院关于构建更加完善的要素市场化配置体制机制的意见」. 2020. Central Government of People’s Republic of China, April 9. http://www.gov.cn/zhengce/2020-04/09/content_5500622.htm.

Working Paper for the Penn Project on the Future of U.S.-China Relations

and innovators to trade and leverage land, labor, and capital, so too should they make it safe and convenient to trade and leverage data.

In 2022, the CPC Central Committee and the State Council released another landmark document that expanded on and deepened this rationale, “Opinions on Building a Data Infrastructure System to Better Leverage the Role of Data Factors,” commonly referred to as the “Twenty Data Articles.”⁹ As its moniker suggests, the document includes twenty principles to serve as a foundation upon which policymakers should formulate data policy and law. The document instructs policymakers and officials to “reasonably lower the threshold for market entities to obtain data, enhance the sharing and inclusiveness of data factors, incentivize innovation, entrepreneurship and creativity, [and] form a development model for data that is legally regulated, involves joint participation, allows each party to get what it needs, and shares the dividends.”

The “Opinions” and the “Twenty Data Articles” not only establish the state’s position that more data circulation means more growth and should thus be enabled, they also provide a diagnosis of what Beijing believes is holding data circulation back. Paraphrasing heavily, these documents—and hundreds of subsequent supporting documents that have been released in the years since—broadly define barriers across three domains:

- **Data supply:** Policy does not sufficiently encourage both public- and private-sector bodies to make data widely available for sale and sharing.
- **Data as property:** A lack of laws and regulations defining ownership rights for data make it unclear who is allowed to profit or otherwise benefit when data is traded or shared.
- **Data as an asset:** Current accounting standards and valuation methods make it difficult to determine data’s true financial value.

These are the systems-level issues that China’s current data strategy seeks to address—and it seeks to address them quickly. The “14th Five-Year Plan for Digital Economy Development,” released just after the “Opinions” in 2021, put China on a five-year timeline for laying down initial solutions to these problems, stating: “[By 2025], a preliminary data factor market should be established. . . . Data ownership confirmation, pricing, and trade should be proceeding in an orderly manner.”¹⁰ Since the release of the “Opinions” and the “Twenty Data Articles,” the state has made significant progress towards that goal, with multiple government bodies tackling related issues from a multitude of angles.

How Beijing is Reducing Barriers to Data Factor Circulation

Numerous Chinese policymakers, academics, and pundits have argued that the supply of high-quality data on the market does not meet demand for such data—a disparity that impacts economic development, hampers innovation, and constrains competitiveness.¹¹ This supply-

⁹ People 人民网. 2022. 「中共中央国务院关于构建数据基础制度更好发挥数据要素作用的意见」. 人民网, December 19. <http://politics.people.com.cn/n1/2022/1219/c1001-32589890.html>.

¹⁰ National Development and Reform Commission. 2022. 「十四五 数字经济发展规划」. NDRC, March 25. https://www.ndrc.gov.cn/fggz/fzzlgh/gjjzxgh/202203/t20220325_1320207.html.

¹¹ National Data Administration. 2025. 「畅通数据汇聚、供给、利用堵点 凝力推进数据集高质量建设」.

Working Paper for the Penn Project on the Future of U.S.-China Relations

demand gap has become particularly problematic in the AI age, as a supply of high-quality data, particularly data in specialized domains, is essential to unlocking AI's transformative potential.¹² The lack of supply, many argue, is rooted in the fact that the laws, regulations, and market mechanisms that govern data transactions are still immature.¹³ Immature trading mechanisms disincentivize and prevent both public and private sector actors from trading data. As such, Beijing has initiated a series of actions designed to establish ground rules, guardrails, and basic infrastructure for data trading. With a legal and market framework for data trading established, policymakers hope that government bodies and private firms will be increasingly incentivized to share and sell the data they collect and hold, and that government bodies, researchers, and companies will find it easier to discover and acquire the data they need.

Unlocking the supply of data held by government and state-controlled entities is central to these efforts.¹⁴ That's because, due to the government's outsized presence in China's market environment, data related to specialized domains, such as travel, finance, and industrial production, is often exclusively collected by and siloed in government agencies or state-owned enterprises, where startups and researchers cannot easily access it. Traditional open data initiatives, which require government bodies to collect data and make it available to the public free of charge, are often inconsistently implemented, in large part because government agencies and SOEs have little incentive to prioritize them—a problem that exists in both the U.S.¹⁵ and China.

To better incentivize government bodies to actively prioritize and pursue the provision of government data, recent Chinese policies and regulations have established legal structures that allow government entities to profit, within reason, from the sale of data that they collect. In recent years, the state has established a relatively new category of data, called “public data” (公共数据), which is defined as data collected and generated by government departments and some state-owned companies in the course of undertaking duties and providing public services.¹⁶ Examples of public data include transportation data collected by the Ministry of Transport, pollution data collected by the Ministry of Ecology and Environment, or non-sensitive data from state-owned

NDA, March 6. https://www.nda.gov.cn/sjj/ywzd/szkjycss/0306/20250306143724097100325_pc.html;

People 人民网. 2025. 「多向发力推动付费数据市场建设」. People 人民网, December 24.

<http://finance.people.com.cn/n1/2025/1224/c1004-40631329.html>; Southern Metropolis Daily 南方都市报. 2025. 「张向宏：高质量数据成 AI 发展关键」. Southern Metropolis Daily, August 28.

<https://www.163.com/dy/article/K82GLLV505129QAF.html>; People 人民网. 2025. 「张于喆郑腾飞：加快构建多层次数据流通交易体系」. People 人民网, May 19.

<http://finance.people.com.cn/n1/2025/0519/c1004-40483073.html>.

¹² CWW. 2026. 「启幕“十五五”| 南邮教授王春晖：“数据要素价值释放年”背景下的中国方案」. CWW, February 12. <https://cww.net.cn/article?id=4D7EA01C7CE0401EA1EF5BB2043A7F52>. Lin Chang-le 林常乐. 2025. 「迈向价值实现：人工智能时代为优质数据付费的必要性与路径」. People 人民网, December 11. https://www.nda.gov.cn/sjj/zwgk/zjjd/1211/20251211102348565646921_pc.html.

¹³ Tsinghua LCG. 2025. 「冯耕中在 2025 中国数字经济发展和治理学术年会上的主旨演讲：数据要素价值挖掘与市场化发展的风险、挑战及应对」. Tsinghua Institute for Laboratory of Computational Social Sciences and State Governance, August 4. <https://lcg.tsinghua.edu.cn/info/1029/2123.htm>.

¹⁴ Nanbu N Shipin 南部 N 视频. 2025. 「梅宏谈数据要素化挑战，建议推动公共数据开放与分级分类管理」. 南部 N 视频, August 28. <https://m.mp.oeeee.com/a/BAAFRD0000202508281118216.html>.

¹⁵ U.S. Government and Accountability Office. 2021. “Open Data: Additional Action Required for Full Public Access.” GAO, December 16. <https://www.gao.gov/products/gao-22-104574>.

¹⁶ People 人民网. 2025. 「加快公共数据资源开发利用」. 人民网, February 16. <http://theory.people.com.cn/BIG5/n1/2025/0216/c40531-40419337.html>.

Working Paper for the Penn Project on the Future of U.S.-China Relations

enterprises, such as China’s water and power utilities, airlines, and mining companies. In January 2025, the NDRC issued trial regulations governing the sale and provision of public data, which permit local governments and national-level state agencies to provide such data for sale, providing that the data does not endanger national security, contain commercial secrets, or infringe on personal privacy.¹⁷ The regulations also set “permissible profit” (profit caps) on public data sales, which are “determined by multiplying operating costs by the permissible profit rate, [which is itself] determined by the average yield of 10-year treasury bonds in the prior year, plus a maximum of six percentage points.” This strategy seeks to both open up new revenue streams for cash-strapped local governments and broaden the availability of data to private innovators, while also attempting to ensure that public data remains affordable and data sales do not become an avenue for corruption and graft.

The state has also sought to increase access to public data by establishing multiple online marketplaces and data trading venues where public data can be found and acquired. In February 2025, the NDA launched the National Public Data Resource Registration Platform, which collects over 400 public data sets from various state-affiliated entities and local government bodies, allowing private companies to shop for available data.¹⁸ Some examples of data sets available via the platform include nationwide production and traceability data on pharmaceuticals covered by the National Healthcare Security Administration’s (NHSA) insurance program, as well as district-level NEV charging infrastructure data for Shanghai, and geospatial data on fishing vessel movement off the coast of Taizhou and associated simulations of marine waste discharge. Multiple other state-managed data trading venues, or “data exchanges,” have been established by local governments in areas such as Shanghai,¹⁹ Guiyang,²⁰ and Hangzhou.²¹

Meanwhile, policymakers are deploying a different mix of incentives and tools to encourage private firms to generate, monetize, utilize, and exchange data. The underlying logic behind Beijing’s approach to increasing private sector data circulation is that enterprises will be incentivized to generate and sell data if they have clearly defined and enforceable legal ownership rights to the data they generate or buy, and can easily find channels through which to capitalize upon it. As such, the state has begun this process by legally affirming that companies may indeed profit from the data they own and urging officials to better define data rights. In December 2024, China’s National Data Administration (NDA) released “Opinions on Promoting the Development and Utilization of Enterprise Data Resources”—a policy that instructs the government to define and enhance the rights and abilities of companies over their proprietary data.²² It begins by stating,

¹⁷ National Development and Reform Commission (NDRC). 2025. 「关于印发《公共数据资源授权运营实施规范（试行）》的通知(发改数据规〔2025〕27号)」. NDRC, January 20.

https://www.ndrc.gov.cn/xxgk/zcfb/ghxwj/202501/t20250116_1395726.html.

¹⁸ CCTV. 2025. 「央视新闻 | 公共数据“超市”来了 事关医保、交通、金融等」. CCTV, March 1.

https://www.nda.gov.cn/sjj/swdt/mtsy/0301/20250301212319852733703_pc.html.

¹⁹ The Paper 澎湃网. 2023. 「上海数据交易所国际板启动建设，探索数据跨境双向流动新机制」. 澎湃网, April 24. https://www.thepaper.cn/newsDetail_forward_22832662.

²⁰ Sohu. 2023. 「贵阳大数据交易所：全国首笔个人数据合规流转场内交易完成」. Sohu, April 27.

https://www.sohu.com/a/670740522_121106687.

²¹ Hangzhou GZW. 2023. 「杭州数据交易所正式揭牌」. Hangzhou Municipal People's Government State-owned Assets Supervision and Administration Commission, August 28.

http://gzw.hangzhou.gov.cn/art/2023/8/28/art_1689495_58901293.html.

²² National Data Administration. 2024. 「国家数据局等部门关于促进企业数据资源开发利用的意见」. NDA,

Working Paper for the Penn Project on the Future of U.S.-China Relations

“Data generated or legally acquired and held by enterprises during their production and operation processes is a crucial resource for enterprise development. Strengthening the development and utilization of enterprise data is also an important measure to promote the construction of our national data market, optimize the efficiency of data [factor] allocation, and maximize [data trading] benefits.”

Of course, the rights of companies to profit from data must be balanced against competing rights and interests, including consumer data privacy and national security. On March 15 2021, Xi Jinping presided over a meeting of the Central Finance and Economics Committee, and urged China’s top leadership to build a legal and regulatory framework that takes the concerns of all parties into account by “strengthening the construction of a data property rights system (数据产权制度).”²³ Similarly, the “Twenty Data Articles” instructed policymakers to “define the legal rights enjoyed by each participant in the process of data production, circulation, and use.”

This “data property rights system” has not fully taken shape, but early evidence indicates that China intends to define differentiated ownership and usage rights frameworks for different types of data. According to the “Twenty Data Articles,” China will “establish [unique rights] systems for public data, enterprise data, and personal data.” For enterprise data that does not include personal information or relate to public interests, the state will “establish a property rights mechanism that separates the right to hold data, process and use data, and operate data products,” thereby “fully guaranteeing the rights of data processors to use data and obtain revenue.”

There is also evidence suggesting that policymakers are exploring the idea of developing a centralized, national “data property registration system”—a registry that would certify and track data ownership similar to land registries, patent offices, or securities depositories. Such a tool would serve as critical infrastructure of a robust data trading market, as it would allow data owners and users to register claims, log usage rights, and trace ownership or usage history of data. Such registries have already been trialed at the local level, in cities including Shenzhen,²⁴ and may soon be piloted at the national level. In June 2025, the NDA released a request for proposals in which it asked think tanks to produce “research on a national data property rights registration system [which should] summarize the experience of existing registration and management systems in the fields of land, securities and futures.”²⁵ The NDA also asked researchers to “propose institutional arrangements for promoting a unified national data property rights registration system, a registration platform construction plan, and a timetable and roadmap for implementation.”

Establishing ownership, however, only solves the question of who controls data, it does not in itself open pathways for enterprises to capitalize on that data. To give enterprises new ways to turn data into cash, the state is experimenting with new ways to “assetize” data. This involves making changes to China’s financial accounting regulations. As it stands, money that firms spend

December 2025. https://www.nda.gov.cn/sjj/zwgk/zcfb/1225/20241225154636252082589_pc.html.

²³ CCTV. 2021. 「习近平主持召开重磅会议 重点研究这两件大事」. CCTV, March 15.

<https://news.cctv.com/2021/03/15/ARTI1f9bk3I8lI9KrPGBufR210315.shtml?spm=C96370.PPDB2vhvSivD.ERPvWJCsPwT9.11>.

²⁴ Shenzhen China. 2023. 「深圳市发展和改革委员会关于印发《深圳市数据产权登记管理暂行办法》的通知」. Shenzhen China, July 4. https://www.sz.gov.cn/cn/xxgk/zfxxgj/zcfg/content/post_10692613.html.

²⁵ National Data Administration, 2025. 「国家数据局政策和规划司 2025 年课题委托研究征集公告」. NDA, June 5. https://www.nda.gov.cn/sjj/swdt/sjdt/0605/20250605171540901805718_pc.html.

Working Paper for the Penn Project on the Future of U.S.-China Relations

to generate data internally is typically recognized on corporate balance sheets as an operating expense—recorded alongside items like employee salaries, cloud storage, or software maintenance—rather than as an investment in an asset expected to generate future returns. For example, a manufacturer may spend many millions of dollars collecting sensor data from factory equipment, or an e-commerce platform may accumulate detailed consumer behavior data through everyday transactions, but the costs associated with generating that data are usually written off rather than capitalized. By contrast, investments in things like property, machinery, or patents are generally capitalized, allowing firms to recognize them as assets expected to generate future returns.

The lack of an assetization framework for data creates a range of problems that Beijing believes disincentivize firms to invest in data. Most notably, it can constrain financing for data-intensive firms. Traditional assets can be pledged as collateral to secure loans, enabling companies to expand operations. But because data assets don't show up on balance sheets, it is not readily recognized by financial institutions, limiting firms' ability to leverage what may, in practice, be their most valuable resource. It also causes complications for economists and policymakers vis-à-vis macroeconomic measurement. When investment in data does not appear as capital formation, productivity growth and the contribution of digital sectors may be systematically undercounted, making it more difficult for policymakers to accurately assess the drivers of growth or design effective industrial policy. Beyond this, the absence of clear assetization frameworks may create distortions in areas such as taxation²⁶ and investment,²⁷ though a full discussion of those issues lies beyond the scope of this report.

Over the past three years, China's Ministry of Finance (MoF) has led the charge to “assetize” data—or, put more simply, to turn data into an asset with a clear financial value that can be recorded on corporate balance sheets. In December 2023, MoF released “Guiding Opinions on Strengthening Data Asset Management,” which outlined plans to “gradually establish and improve a data asset management system [and] continuously improve and enrich the economic value [of data assets].”²⁸ Soon thereafter, in January 2024, MoF issued interim rules that explicitly create a standardized accounting framework for data as a reportable economic asset class.²⁹ Under the regulations, once data meets certain criteria, it can be recognized as either an intangible asset (when held for internal use), or as inventory (when produced for sale). Data-heavy companies are required to disclose data inventory and data intangibles as separate line items, allowing for more visibility in terms of data's role in growth at the macro level. The rules also allow certain data-related expenditures (including activities such as data collection, cleaning, labeling, and analysis) to be capitalized when they directly contribute to the creation of a qualifying data asset, thereby enabling some data-related work to shift from operating expense treatment toward investment. In June 2025,

²⁶ Mu'azu Usman, Ibrahim, and Tapash Saha. 2022. “An Overview of Tax Challenges of Digital Economy,” *Asia-Pacific Journal of Management and Technology* 3 (2): 56-63, October. [10.46977/apjmt.2022v03i02.005](https://doi.org/10.46977/apjmt.2022v03i02.005).

²⁷ Zéghal, Daniel, and Anis Maaloul. 2011. “The Accounting Treatment of Intangibles - A Critical Review of the Literature.” *Accounting Forum* 35 (4): 262-274. <https://doi.org/10.1016/j.accfor.2011.04.003>.

²⁸ Ministry of Finance. 2023. 「关于印发《关于加强数据资产管理的指导意见》的通知」. Ministry of Finance of the People's Republic of China, December 31. https://www.gov.cn/zhengce/zhengceku/202401/content_6925470.htm.

²⁹ Ministry of Finance. 2023. 「关于印发《企业数据资源相关会计处理暂行规定》的通知」. Ministry of Finance of the People's Republic of China, August 1. https://kjs.mof.gov.cn/zhengcefabu/202308/t20230821_3903354.htm.

Working Paper for the Penn Project on the Future of U.S.-China Relations

former deputy managing director of the International Monetary Fund and former deputy governor of China's central bank Zhu Min touted these efforts at World Economic Forum in Tianjin, stating, "At the policy level, China currently recognizes that data is included in the balance sheet of enterprises as a factor of production, which is of great significance because China is the world's largest source of data, and both its public sector and its private institutions have become important data providers."³⁰

Pilots are also underway to test the viability of using data assets instead of physical assets to secure loans or determine loan conditions. Chinese banks—and indeed, most banks—are often reluctant to accept data as collateral to back a loan, in large part due to the fact that in contrast to physical collateral, such as property or machinery, the market value of data assets are often unclear, and banks do not have the expertise necessary to conduct reliable data valuations. This is particularly problematic for data-heavy startups seeking to access capital to drive expansions, as such firms may not own many physical assets, but may be in possession of valuable data assets.

To explore solutions to this problem, Chinese state banks are participating in a series of pilot programs which leverage data as collateral. These pilots typically involve three parties: a bank, a data-owning company seeking a loan, and one of several state-backed data trading institutions which independently certify the value of the company's data assets. In August 2024, the Chongqing Branch of Huaxia Bank and a Chongqing-based state-backed data trading institution partnered to offer a "data asset-linked loan" totaling \$1.3 million RMB to Chongqing Liangjiang Smart City Investment Development Co., Ltd. Under this scheme, the data trading institution leveraged its data valuation expertise to certify the data's value, and the bank based the interest rate of the loan on that certified value.³¹ Similar partnerships have been undertaken between the Shanghai Data Exchange and the Shanghai branch of China Construction Bank,³² and the Hubei Provincial Data Bureau and the Hubei Branch of the Industrial and Commercial Bank of China.³³ To enable such pilots, the MoF has also supported research into standardized valuation methods to allow appraisers and evaluators to assign a consistent monetary value to data. In September 2023, the China Appraisal Society, an industry body associated with MoF, released guidance on how to conduct data appraisals, providing suggested metrics that appraisers can use to determine its value.³⁴ This included metrics, such as whether or not the data was collected legally, how large the dataset is, how often the data is updated, the quality and timeliness of the data, and how many use cases there are for the data.

³⁰ Caixin. 2025. 「朱民：“人工智能+”带来各行业应用涌现 成为经济发展动力」. Caixin, June 25. <https://www.caixin.com/2025-06-25/102334150.html>.

³¹ Baidu. 2024. 「全国首笔“数据资产挂钩抵押贷款”落地」. Baidu, August 2021. <https://baijiahao.baidu.com/s?id=1807952386739746428&wfr=spider&for=pc>.

³² Sina Finance. 2024. 「“数易贷”首笔数据资产质押贷款发放」. Sina Finance, March 12. <https://finance.sina.cn/2024-03-12/detail-inamzmtv0805930.d.html>.

³³ Hubei Provincial Data Bureau. 2025. 「湖北“数易贷”，您需要了解这些」. Hubei Provincial Data Bureau, May 15. https://sjj.hubei.gov.cn/bmdt/sjjyw/jn/202504/t20250430_5637378.shtml.

³⁴ Weixin. 2022. 「中评协《数据资产评估指导意见(征求意见稿)》及起草说明」. Weixin, June 17. https://mp.weixin.qq.com/s/b17OZAJ_jf1AhUdQp60oQg; 21 Jingji 财经. 2023. 「《数据资产评估指导意见》出台，提供数据估值实操指南、强调质量评价」. 21Jingji 财经, September 8. <https://m.21jingji.com/article/20230908/herald/e6c61dbb73d61548266676bf1712dd09.html>.

Working Paper for the Penn Project on the Future of U.S.-China Relations

The emergence of generative AI has increased the urgency with which the state has sought to expand data supply, particularly for high-priority sectors. Even as the broader, long-horizon data reforms described above are being implemented, Beijing has also rolled out sector-specific AI policies that encourage industry collaboration to build AI-ready datasets for targeted sectors. In January 2026, China's industrial ministry released a policy on encouraging AI adoption in the manufacturing sector, calling on companies and officials to establish large datasets for manufacturing automation.³⁵ In November 2025, the National Health Commission released an AI policy for the healthcare industry, calling on hospitals and researchers to establish high-quality datasets for medical diagnostics and research.³⁶ In August 2025, the National Data Administration (NDA) published policy recommendations by Liang Zheng, Vice President of the Institute for International Governance of Artificial Intelligence at Tsinghua University. The recommendations address how China can ensure the supply of high-quality datasets for AI training and other data-intensive applications, and suggest China launching a national fund for AI datasets, piloting data use cases in key sectors like industrials, agriculture, healthcare, and finance, and clarifying the obligations of companies and governments to make socially useful data available.³⁷

Whether due to these data factor-centric policies or not, official statistics show that China's data supply is increasing, and that Chinese companies are activating more available data. In April 2025, the National Data Administration released the annual National Data Resources Survey Report, the most authoritative official accounting of China's datasphere.³⁸ The report stated that in 2024, national data production volume reached 41.06 ZB, a year-on-year increase of 25%, suggesting an increase in data supply. The same report also indicates that China's enterprises are actively using 62% percent of total data stored, an increase of 22.73% y/y, suggesting that Chinese companies are increasingly leveraging data resources for business purposes. Finally, the report notes that the number of high-quality datasets available for AI training increased 27.4% y/y.³⁹ Taken together, these indicators are likely to reinforce policymakers' belief that current policies are producing results, suggesting that China will continue to deepen and expand its data factor strategy during the 15th Five-Year Plan period.⁴⁰

A Data Strategy for the United States

Nothing in the above is meant to suggest that China's data strategy is sound or optimal, or that the United States should seek to duplicate it whole cloth. In fact, some aspects of China's

³⁵ Ministry of Industry and Information Technology of the People's Republic of China. 2026. 「八部门关于印发《“人工智能+制造”专项行动实施意见》的通知」. January 7.

https://www.miit.gov.cn/zwgk/zcwj/wjfb/tz/art/2026/art_01010414608a4226b30687773bb21bdf.html.

³⁶ General Office of the National Health Commission. 2025. 「关于促进和规范“人工智能+医疗卫生”应用发展的实施意见」. October 20. https://www.gov.cn/zhengce/zhengceku/202511/content_7047018.htm.

³⁷ National Data Administration. 2025. 「推进高质量数据集建设 筑牢数智时代新基座」. NDA, August 19. https://www.nda.gov.cn/sjj/zwgk/zjjd/0819/20250819222656187902884_pc.html.

³⁸ National Data Administration. 2025. 「《全国数据资源调查报告（2024年）》正式发布」. NDA, April 29. https://www.nda.gov.cn/sjj/ywpd/sjzy/0429/20250429190723758925417_pc.html.

³⁹ Zhaopeng Chu, Xin Chen, and Jun Yang. 2025. “Impact of Data Factor and Data Integration on Economic Development: Empirical Insights from China.” *Telecommunications Policy* 49 (8), September. <https://doi.org/10.1016/j.telpol.2025.103004>.

⁴⁰ China Economic Net. 2025. “China to Further Propel Its Digital Push Over Next 5 Years,” China Economic Net, December 26. http://en.ce.cn/main/latest/202512/t20251226_2667560.shtml.

Working Paper for the Penn Project on the Future of U.S.-China Relations

policy approach are encountering significant implementation challenges. For instance, China's attempts to increase data trading volumes and discoverability through the establishment of state-backed data marketplaces has met with resistance from the private sector, as companies have proved wary of conducting data transactions on state-backed exchanges, forcing some local governments to resort to offering financial bounties to companies that list their data in government venues.⁴¹ Likewise, early MoF efforts to introduce accounting standards requiring companies to record data as an intangible asset on balance sheets led to considerable confusion during the first reporting season, as state-prescribed data valuation methods proved difficult to apply, prompting many listed data-driven companies to withdraw and revise their annual reports.⁴²

However, China's whole-of-government effort to create a growth-focused data policy framework throws the United States' lack of such a framework into sharp relief. Although modest efforts have been made at the state and federal level to increase the circulation of and access to public sector data—primarily through government-to-government sharing or open data initiatives—many of these initiatives have been deprioritized, defunded, or overlooked as “nice-to-haves,” rather than viewed as potentially powerful tools to be leveraged as part of a broader economic strategy. Instead, U.S. policymaker time, attention, and resources have been focused almost exclusively on defensively responding in whack-a-mole fashion to data security threats posed by countries of concern. Just in the last five years, policymakers have taken action against Chinese-made telecom equipment, smart car software, port cranes,⁴³ cellular modules,⁴⁴ and Chinese mobile apps such as TikTok and WeChat.⁴⁵ Meanwhile, comparatively little has been done to address lack of data supply for researchers, reduce barriers to data sharing among corporations, or ensure data trading can proceed safely by protecting consumer data privacy.

This stands in evident contrast not only to China's approach, but also to the approach of nearly every major U.S. ally, most of whom have formulated wide-reaching, forward-looking frameworks to prepare their economies and business environments to better use and share data. The EU has formulated a data strategy predicated on the idea that “Europe should offer an environment that supports data-driven innovation and stimulates demand for products and services that rely on data as an important factor of production.”⁴⁶ Japan's data strategy centers on establishing data governance regulations and norms, while increasing and facilitating the flow of data in the private sector for social efficiency and economic gain.⁴⁷ The UK's National Data

⁴¹ 21 Jingji 财经. 2023. 「最高 20 万！在上海数交所登记挂牌或购买数据产品可获一次性补贴」. 21 Jingji 财经, July 26. <https://m.21jingji.com/article/20230726/herald/65470d578890c8661bff608aa6ba8aff.html>.

⁴² 21 Jingji. 2024. 「奥飞数据半年报数据资源已修改清零，已有 5 家上市公司财报因数据资源发生更正或修改」. 21 Jingji, August 29. <https://www.21jingji.com/article/20240829/herald/8e257a1425829c61d7d0051b26ff2623.html>.

⁴³ Sabin, Sam. 2024. “Why China Hawks Care So Much About Cranes.” *Axios*, September 17. <https://www.axios.com/2024/09/17/chinese-cargo-cranes-security-risks>.

⁴⁴ The Select Committee on the CCP. 2023. “Letter to FCC Chair on Chinese Internet Connectivity Modules.” The Select Committee on the CCP, August 8. <https://selectcommitteeontheccp.house.gov/media/letters/letter-fcc-chair-chinese-internet-connectivity-modules>.

⁴⁵ 2024. *Protecting Americans from Foreign Adversary Controlled Applications Act*, 118th Congress, March 7. <https://www.congress.gov/bill/118th-congress/house-bill/7521>.

⁴⁶ European Commission. 2020. “A European Strategy for Data.” February 19. <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX%3A52020DC0066>.

⁴⁷ National Strategy Office of IT, Cabinet Secretariat. 2021. “National Data Strategy.” The Government of Japan,

Working Paper for the Penn Project on the Future of U.S.-China Relations

Strategy is predicated on the notion that “data is now the driving force of the world’s modern economies,” and that “data and data use [should be] seen as opportunities to be embraced, rather than threats against which to be guarded.” As such, the UK seeks to “harness the power of data to boost productivity, create new businesses and jobs, and improve public services.”⁴⁸ The Australian Data Strategy, released in 2021, focuses on activating the power of “publicly held data as a key driver of the future economy,” and on treating public sector data as a national asset.⁴⁹ In failing to formulate such a strategy, the U.S. is leaving potential future growth drivers and efficiency boosters on the table.

Moreover, failing to lower barriers to data access also risks kneecapping U.S. competitiveness and leadership in the AI era, when the supply of large data sets is a critical component of industrial R&D and scientific research. The National Science Foundation has argued that a lack of access to such data sets means that only the most well-funded organizations are able to compete in AI, dampening data circulation, and hampering the ability of smaller firms and research bodies from contributing to U.S. competitiveness.⁵⁰ The NSF further argues that “such an imbalance threatens our Nation’s ability to cultivate an AI research community and workforce that reflect America’s rich diversity and the ability to harness AI to advance the public good.” Countless papers from across the research ecosystem support this argument. One example of many includes a paper published by the National Institute of Health in December 2023, which undertook a survey of machine learning researchers in the biomedical sector and concluded that AI-powered biomedical research is significantly hampered due to the poor availability of diverse, high-quality data sets.⁵¹

Developing a proactive policy and legal framework for enhancing high-quality data supply and circulation is a long-term endeavor, one that requires proactive and sustained commitment over time—a commitment that the U.S. has not yet made at scale. To date, U.S. policymakers have largely operated on the assumption that market forces and private incentives alone will produce sufficient access and sharing. But there are clear limitations to this approach. First, existing macroeconomic statistics provide only a partial picture of how data contributes to productivity and growth, leaving policymakers without a reliable evidence base to assess whether data is being effectively mobilized. Second, evidence suggests that market incentives do not consistently encourage data sharing; firms and public institutions often face legal uncertainty, competitive concerns, and reputational or regulatory risks that discourage them from making high-value data more widely available. The result is a fragmented environment in which valuable data remains

June 18. https://www.digital.go.jp/assets/contents/node/basic_page/field_ref_resources/0f321c23-517f-439e-9076-5804f0a24b59/20210901_en_05.pdf.

⁴⁸ UK Department for Digital, Culture, Media & Sport. 2020. “National Data Strategy.” UK Department for Digital, Culture, Media & Sport, December 9. <https://www.gov.uk/government/publications/uk-national-data-strategy/national-data-strategy>.

⁴⁹ Australian Government Digital Transformation Agency. 2023. “Australian Data Strategy.” December 15. <https://architecture.digital.gov.au/strategy/australian-data-strategy>.

⁵⁰ National Artificial Intelligence Research Resource Task Force. 2023. “Strengthening and Democratizing the U.S. Artificial Intelligence Innovation Ecosystem: An Implementation Plan for a National Artificial Intelligence Research Resource.” January. <https://nsf.gov-resources.nsf.gov/2023-10/NAIRR-TF-Final-Report-2023.pdf>.

⁵¹ Ng, Madelena, et al. 2023. “Perceptions of Data Set Experts on Important Characteristics of Health Data Sets Ready for Machine Learning.” *JAMA Netw Open* 6 (12), December 1. [10.1001/jamanetworkopen.2023.45892](https://doi.org/10.1001/jamanetworkopen.2023.45892).

Working Paper for the Penn Project on the Future of U.S.-China Relations

siloed despite its potential economic and technological benefits. The United States should therefore begin taking deliberate steps to create the legal, economic, and institutional conditions necessary to facilitate responsible data sharing and improve data circulation across sectors. A white paper by the World Economic Forum and Boston Consulting Group found that the value of such data sharing could reach \$100 billion USD and deliver gains that no single firm could achieve independently.⁵²

Recommendations

1. The U.S. Commerce Department should provide additional funding to the Bureau of Economic Analysis (BEA) to modernize economic measurement frameworks that capture data's role in growth and productivity.

A good strategy starts with good information, but at aggregate level, current-day macroeconomic statistics are not robust enough to provide a thorough accounting of the value of data-driven activity.⁵³ This likely results in a significant underestimation of data's contribution to economic activity and productivity.⁵⁴ Without a robust economic framework for valuing data and the benefits to be gained by increasing data sharing and use, the United States will be poorly positioned to assess how policies that expand data sharing, exchange, and access contribute to growth, and therefore poorly incentivized to design evidence-based policies that effectively promote it.⁵⁵ The BEA undertakes forward-looking research on how to better measure the various impacts of data on the economy, but progress has been slow in part due to lack of funding.⁵⁶ The BEA should be empowered to expand research into measuring the value of data's economic contribution from a strategic perspective, as well as explore novel measurements for previously underexplored frontier economic questions, such as how data assets and AI combine to increase economic productivity.

2. U.S. policymakers should support the creation of sector-specific data trusts that allow manufacturing and industrial firms to share narrowly defined operational data under standardized governance and privacy-preserving technical frameworks.

⁵² World Economic Forum. 2020. "Share to Gain: Unlocking Data Value in Manufacturing." World Economic Forum, in Collaboration with Boston Consulting Group, January.

https://www3.weforum.org/docs/WEF_Share_to_Gain_Report.pdf.

⁵³ OECD. 2022. "Measuring the value of Data and Data Flows." *OECD Digital Economy Papers* 345, December 14.

<https://doi.org/10.1787/923230a6-en>.

⁵⁴ *Ibid.*

⁵⁵ U.S. Bureau of Economic Analysis. 2024. "Digital Economy." BEA, July.

<https://www.bea.gov/data/special-topics/digital-economy>.

⁵⁶ Rassier, Dylan G., Robert J. Kornfeld, and Erich H. Strassner. 2019. "Treatment of Data in National Accounts." Paper Prepared for the BEA Advisory Committee, May. <https://www.bea.gov/sites/default/files/2019-05/Paper-on-Treatment-of-Data-BEA-ACM.pdf>;

Highfill, Tina, and Brian Quistorff. 2023. "Measuring Digital Intermediation Services: Experimental Estimates of Gross Output for Rideshare, Travel Services, and Food/Grocery Delivery Service Platforms." U.S. Bureau of Economic Analysis, October.

<https://www.bea.gov/sites/default/files/papers/BEA-WP2023-8.pdf>;

Bridgman, Benjamin, Tina Highfill, and Jon Samuels. 2023. "Introducing Consumer Durable Digital Services into the BEA Digital Economy Satellite Account." U.S. Bureau of Economic Analysis, June.

<https://www.bea.gov/sites/default/files/papers/BEA-WP2023-5.pdf>.

Working Paper for the Penn Project on the Future of U.S.-China Relations

While firms increasingly generate valuable data internally, many of the highest-value use cases such as predictive maintenance, supply-chain visibility, quality traceability, and counterfeit prevention, require cross-firm data sharing. However, companies remain understandably reluctant to pursue cross-firm sharing due to concerns over competitive disadvantage, commercial confidentiality, antitrust legal risk, and cybersecurity vulnerabilities. These are rational concerns, and any policy response must take them seriously. Policymakers should therefore pursue a targeted mix of interventions: addressing antitrust risk directly by establishing well-defined safe harbors that explicitly permit operational data sharing, for example covering equipment performance, logistics, and defect data, while clearly excluding data that touches on pricing, capacity, or competitive strategy; reducing confidentiality and competitive concerns by funding model data-sharing agreements that establish clear boundaries around what data enters a trust, who can access it, and under what conditions, with strong provisions to prevent larger participants from exploiting smaller ones; and mitigating cybersecurity risk by investing in federated and privacy-preserving technical architectures that allow firms to contribute data without centralizing it in ways that create attractive targets for attack. Critically, rather than relying on industry self-organization alone, policymakers should consider conditioning certain procurement preferences or industrial policy benefits on participation in certified data-sharing arrangements, giving firms a concrete incentive to engage.

3. Congress should pass the CREATE AI Act or similar legislation to formalize the National AI Research Resource (NAIRR) and expand access to high-quality, domain-specific datasets for researchers.

In the absence of a national strategy designed to increase data sharing and access in all sectors of the economy, policymakers must ensure an ongoing data supply in mission-critical domains. Most importantly, as the U.S. pushes to retain its lead in artificial intelligence, AI researchers and startups need to train and test models on novel, high-quality datasets, including sensitive education, health, and other regulated data. However, they lack a scalable, shared infrastructure that guarantees compliant, managed access to those datasets.

The NAIRR Pilot is an effort by the National Science Foundation (NSF) to democratize access to the compute resources and large specialized datasets needed to develop cutting-edge AI tools. Launched in 2024, the NAIRR Pilot has supported over 650 projects across 50 states through partnerships with multiple federal agencies and private sector partners.⁵⁷ The pilot received high-level endorsement in the Trump administration's July 2025 AI Action Plan, which called to make the program a critical component of national AI strategy, but which did not indicate if or how new funding would be allocated.⁵⁸ In September 2025, the NSF announced a solicitation for a NAIRR Operations Center to transition from a short-term pilot to a permanent program. However, current funding levels remain far below what many advocates envisioned for a full-scale NAIRR. The CREATE AI Act, which passed out of committee in both chambers with bipartisan support, originally proposed \$430 million USD annually, totaling \$2.6 billion USD over five years, but was never enacted into law.⁵⁹ The Act was reintroduced in 2025 without any specified funding levels,

⁵⁷ NAIRR Pilot. N.d. "Advancing US Innovation in Artificial Intelligence." National Artificial Intelligence Research Resource Pilot. <https://nairrpilot.org/>.

⁵⁸ The White House. 2025. "Winning the Race: America's AI Action Plan." The White House, July. <https://www.whitehouse.gov/wp-content/uploads/2025/07/Americas-AI-Action-Plan.pdf>.

⁵⁹ Alder, Madison. 2024. "Legislation to Codify NAIRR, Authorize Safety Body Among Nine AI Bills Passed by

Working Paper for the Penn Project on the Future of U.S.-China Relations

and with new language that allows NAIRR to accept private and public sector donations, meaning that the program would not have access to stable project support.⁶⁰ Public reporting indicates that NAIRR currently operates on just \$25-30 USD million per year, with the Operations Center receiving only \$35 million USD over five years from NSF's existing budget.⁶¹ This represents less than 10% of the resources experts deemed necessary for a full-scale program. Without adequate congressional authorization and funding, NAIRR cannot scale to meet surging demand from researchers nationwide and will force NSF to continually divert resources from other critical research initiatives.

House Panel.” FedScoop, September 12. <https://fedscoop.com/legislation-to-codify-nairr-authorize-safety-body-among-nine-ai-bills-passed-by-house-panel/>.

⁶⁰ Congress. 2025. *CREATE AI Act of 2025*, 119th Congress, March 26. <https://www.congress.gov/bill/119th-congress/house-bill/2385/text#toc-HB0256A776D354906AA96FE041009507B>.

⁶¹ Alder, Madison. 2025. “NSF Announces Up to \$35 Million to Stand Up AI Research Resource Operations Center.” FedScoop, September 3. <https://fedscoop.com/nsf-announces-35-million-stand-up-ai-research-resource-operations-center-nairr/>.