

Made in China: tech in 2022

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Executive Summary

China is striving to become the technological powerhouse of the world. It is making huge investments and implementing policies to become the world's foremost innovator, particularly in high tech industries, and to export its technologies around the world. Its rapid technological advances in the past few decades have contributed significantly to its significant economic growth and expanded geopolitical influence. Today, any conversation to do with technology, from 5G to electric vehicles to biopharma, will likely mention China. To understand how China got to where it is today and where it will be going next, there needs to be a strong understanding of how the Chinese government has used policies to promote (or stunt) the growth of industries, what the innovation and market landscapes are in China, and how China has used technology, directly or indirectly, as an arm of foreign policy. The aim of 'Made in China: tech in 2022', is to offer a comprehensive review of all things 'technology' in China: its policies, latest innovations, markets, and exports.

This report is divided into four sections:

1. Review of China's Tech Policies: The CCP has long maintained a friendly regulatory environment for innovation in the platform economy. However, vast Big Tech firms were deemed a threat to market dynamism and state sovereignty, prompting the launch of Operation Cyber Sword in late 2020. While technological innovation was still promoted, the Chinese government introduced the Anti-Monopoly Law and E-Commerce law to reign in the influence of Big Tech, and these moves are in line with the drive towards 'common prosperity', stability, and control over Chinese society. This section offers an overview of antitrust regulation in the tech sector, and offers examples of crackdowns in sub-industries, including fintech, insurance tech, e-commerce, ed-tech, and entertainment.

2. Key Technologies and Competitions: China is no longer playing catch-up in technological advances. In many cases it has surpassed and even eclipsed its main competitors such as the US, South Korea, and Japan in certain technologies. China's drive towards increased self-sufficiency, as well as international influence over supply chains and technological products has been backed by strong financial, policy, and regulatory support. This section examines developments in 5 technologies: 5G, semiconductors, artificial intelligence, biopharma, and electric vehicles, diving deep into the degree of Chinese influence, the main players, the relevant government policies, and potential geopolitical risks.

3. Venture Capital "Winter" in China: This section reviews the venture capital and IPO markets in China, which is extremely important as a lot of funding is directed to the strategically important tech sector. The Chinese market for private investment capital has undergone sweeping changes in the past decade with the institution of a novel "venture-capital industrial complex". After years of state-backed venture capital prosperity, the market hit a slump in 2022, but the Chinese government has responded with a full-force effort to support a pipeline of new public listings.

4. China's Africa Strategy: Africa's tech scene is witnessing a flourishing presence of Chinese companies. This presence is in part linked to the Digital Silk Road, under China's



broader Belt and Road Initiative. Our final section offers a snapshot of Chinese presence in Africa through the lens of the phone and app market, 4G and 5G infrastructure, data centres, TV satellites, fintech, surveillance and AI technologies, and tech education programmes. While on one hand the expansion of Chinese companies into Africa has been a vital help for the establishment of digital infrastructure, it has presented some concerns about digital sovereignty.

Note: This report looks at tech in China up till August 2022. We intend to publish further reviews regularly to track the quickly changing tech landscape and update our predictions.



Review of China's Tech Policies

Marko Cem Zerunyan, Matheus Mora Machado

Overview

The Chinese government launched “[Operation Cyber Sword](#)” in late 2020. It involved 14 agencies and ministries in regulating and reforming the tech industry, involving six legislative acts and [various antitrust guidelines](#). The most active period of Cyber Sword resulted in close to [\\$3 billion](#) in fines by the end of 2021 as well as state interference in tech IPOs and app stores. There have, since February 2022, been reports that the Chinese government is [easing](#) its crackdown on the tech sector.

The Chinese government cast a wide net over online activities and tech sub-industries through Cyber Sword, targeting online live-commerce, monopolisation in online markets, internet advertising, decentralisation of online sales, and illegal animal and plant trade on digital platforms. Whilst the most prominent impact has been on China's "Big Tech" companies — notably Alibaba, Tencent, Didi, and Meituan — it has also severely hit SMEs in the Fintech, e-Commerce, Edtech, and Entertainment sub-industries. Data from the China Academy of Communications Technology [showed](#) that investment and financing in the Chinese internet sector plummeted by 76.7 percent year-on-year in Q1 2022. Likewise, employment data from the Cyberspace Administration of China [highlighted](#) 216,800 job departures in the tech sector from the period of July 2021 to March 2022.

The full context of Operation Cyber Sword must be understood with consideration of the “[New Development Stage](#)” declared by Xi Jinping, the leader of the Chinese Communist Party (CCP). Broadly, the project seeks to cultivate Xi's desire of Chinese technological hegemony and self-sufficiency. The [digital platform economy](#) is vital to China's prosperity in the tech sector, and the recent crackdown has had two main effects: firstly, maintaining state control over Big Tech, and secondly, steering investment and innovation in 5G, artificial intelligence, biotechnology, semiconductors and other strategic areas.

Tech Crackdown Timeline: Headline Developments

November 2020: Beijing interferes in the potential record-breaking \$37bn initial public offering by Ant Group, an affiliate company of Alibaba Group.

February 2021: A fresh set of antitrust rules are introduced for the Chinese tech industry, including oversight on algorithms that may disrupt public order and spending behaviour.

April 2021: After a series of fines imposed on tech giants like Tencent and Baidu for reportedly monopolistic practices, Alibaba is given a \$2.8 antitrust fine whilst Ant Group is forced into a supervised restructuring from the Chinese central bank.



July 2021: Ride-hailing platform Didi is banned from Chinese app stores after finalising its initial public offering on the New York Stock Exchange. A \$1.2 billion penalty is levied after a year-long investigation of the firm's cybersecurity processes.

August 2021: The Chinese Ministry of Education ushers in restrictions on the amount of time under-18 minors can spend playing on video game platforms throughout the week. These restrictions mark the beginning of a nine-month freeze on publishing licences for video games.

September 2021: Chinese authorities double down on regulation of the cryptocurrency industry with a sweeping ban on all crypto-related activities and services, building on the crackdown on mining in May of the same year.

December 2021: Zhang Gong, head of the State Administration for Market Regulation, promises in a discussion with state-run [Xinhua News Agency](#) that antitrust rules would continue to be tightened in the tech sector through 2022.

February 2022: The Cyberspace Administration of China (CAC) announces that it held a symposium in January with Chinese tech giants. These meetings are said to have established confidence and a "clearer understanding" of developments under the new regulatory regime. This symposium marks the start of the easing of the tech crackdown.

March 2022: Shares on the Shanghai, Shenzhen and Hong Kong stock exchanges re-surge to the strongest performance by the Hang Seng Index in over a decade after President Xi and Premier Li indicate regulatory relaxation during their speeches at the State Council's Financial Stability and Development Committee.

June 2022: After months of positive developments in the tech market, such as grants of publishing licences by China's gaming regulator and approval of Didi's investment in state backed Sinomach Automobile Co Ltd, the government approves a revived initial public offering effort by Ant Group.

Antitrust Reforms

The Rationale for Antitrust Reform

The rationale for antitrust reform in China is complex and multifactorial. Although reform has certainly been premised on numerous considerations—spanning societal, economic, and legal domains—it is, above all, political in nature, and is rooted squarely within the CCP's [grand strategic vision](#) for the Chinese state. That is not, however, to detract from the importance of the aforementioned domains: although politics has shaped the substance of antitrust reforms, the CCP's political ends necessarily turn on social, economic, legal, and commercial means. In this context, the primary motivations for antitrust reform have been to secure 'common prosperity' and maintain state control over Chinese society.

In the late twentieth century, Deng Xiaoping, who ruled as the paramount leader of the PRC from 1978 to 1992, engaged in an intensive [liberalisation](#) of the Chinese economy in a bid to



establish the country as an economic powerhouse, responsible for much of the world's manufacturing output and thus much of its exports. During that period, there were virtually no antitrust laws in China. Chinese companies were not yet large enough, and [markets](#) not yet concentrated enough, to justify the imposition of antitrust laws that might constrain a nascent industrialised economy from cementing itself as the 'world's factory' and achieving Deng's goal of a '[moderately prosperous society](#)'.

During Deng's time, the CCP primarily concerned itself with pursuing [rudimentary economic policies](#), such as allowing urban Chinese to launch small businesses and buy commercial goods. Instead of antitrust laws, [government intervention](#) in markets consisted mostly of price controls (usually and especially in the agricultural sector), high barriers to entry, and the presence of State-Owned Enterprises.

In the early twentieth century, Jiang Zemin—who served as General Secretary of the CCP from 1989 to 2002—identified the coming 20 years as a period of '[strategic opportunity](#)' for China. Chinese [grand strategy](#) no longer sought to establish a 'moderately prosperous society'. Rather, it [looked to](#) maximise state power in the context of a centralised government, ensure territorial integrity and national security, maintain social stability by promoting an ethnically and economically homogeneous society, and achieve high levels of economic prosperity. In order to do so, it became necessary for the Chinese economy to shift from a production to a consumption-oriented model, so as to avoid the middle income trap.

Where technology is concerned, the CCP adopted the posture of '[innovate then regulate](#)'. This approach has harmoniously completed the Chinese economy's shift to consumption-based growth. After decades of unprecedented economic expansion, where GDP [averaged](#) a growth rate of ten percent, the 2008 financial crisis provoked a serious decline in the growth rate of the Chinese economy. The rise of China's platform economy had the potential to remedy its economy's woes, and, in the long-term, put it on equal footing with the U.S. Indeed, the platform economy has [radically lowered transaction costs](#), improved market efficiency by correcting information asymmetries between buyers and sellers, created more job opportunities, and rallied the Chinese stock market. The CCP was thus welcoming of the platform economy. It embraced the lack of antitrust laws in place to regulate the size and scope of China's rising 'Big Tech' giants so that they could continue to innovate and encourage consumption across the economy.

In March 2013, Xi Jinping ascended to power as President of the PRC. Xi began intensively centralising state power across the industrial, societal, and governmental domains to bring about a '[fair and sound market economy](#)'. Notwithstanding this centralisation, the CCP continued to foster a friendly regulatory environment for the platform economy. In 2015, the State Council unveiled the '[Internet Plus](#)' initiative: a five-year plan to integrate manufacturing and services industries with cloud computing, big data, and other such technologies. [Backed](#) by favourable tax schemes to encourage innovation and government-sponsored incubators, the platform economy continued to grow in the backdrop of the CCP's '[accommodative and prudential](#)' approach to antitrust, in the words of Premier Li Keqiang.

By 2020, the digital economy was [worth](#) some \$6 trillion and accounted for nearly 40% of China's GDP. The platform economy also wielded the political, social, and economic power that accompanied such a high share of the GDP. Although the ownership interests of Big Tech



firms were [traditionally aligned with those of political elites](#), complex ownership structures—most notably in the case of Ant Group—began to diminish the influence that the CCP could exert on such firms from within. It also began to unduly restrict the influence that the CCP could exert from the outside, as firms like Alibaba and Didi began to successfully lobby the CCP to enact supportive regulation and initiatives. Thus, the Chinese Big Tech firms grew ‘[so powerful that they \[became\] a threat to the market’s dynamism and the state’s sovereignty](#)’. Simultaneously, against the backdrop of the devastating economic impact of COVID-19 lockdowns, the CCP began to promote ‘common prosperity’ far more aggressively—it being key to securing sustainable economic growth and social stability.

It is in this context that, in late 2020, the CCP introduced ‘Operation Cyber Sword’ in a bid to swiftly crackdown on the excess influence of the Chinese platform economy. Although the CCP is certainly continuing to promote Chinese technological innovation, that innovation has given way to Xi Jinping’s political aims: namely, the transition from the ‘[freewheeling “capitalism”](#)’ that characterised the growth of Chinese Big Tech to an economy rooted in socialist principles. Furthermore, the CCP has learned from the Western experience with Big Tech, which produced much social instability and polarisation as a result of greater economic inequalities, amongst other factors. This threat is particularly acute where the CCP is concerned. Not only are social and economic inequalities squarely antithetical to the CCP’s ethos, but, on a practical level, they may spur Chinese citizens to begin questioning the authority of the CCP—which could prove fatal to the CCP’s aims of maximising state control and maintaining social stability.

The Substance of Antitrust and Other Regulatory Reforms

‘Operation Cyber Sword’, the [Anti-Monopoly Law](#), and other such initiatives have sought to reign in the influence of Big Tech by significantly reducing their ability to undertake mergers and acquisitions, bolstering the CCP’s merger review capabilities, and strengthening penalty regimes.

The primary regulatory reforms that have been enacted to crack down on the platform economy in an antitrust context are the Anti-Monopoly Law and the [E-Commerce Law](#). These regulations are [enforced](#) by both the Cyberspace Administration of China (CAC) and the State Administration for Market Regulation (SAMR), established in 2014 and 2018 respectively. The SAMR focuses primarily on antitrust and consumer protection, whilst the CAC focuses on data security, content management, and also consumer protection.

The E-Commerce Law:

The [E-Commerce Law](#) was China’s [first](#) comprehensive legislative initiative aimed at regulating e-commerce in the country, despite its prevalence for years before the Law came into effect. The Law came into effect on 1 January 2019.

Its [definition](#) of what constitutes an ‘e-commerce’ platform is quite wide, ranging from ‘e-commerce operators’—who are natural persons or incorporated entities that conduct business through information networks to sell goods or services—to ‘platform operators’—who are natural persons or incorporated entities that provide only platforms for businesses, amongst



other such services. This wide definition has been stipulated in order to maximise the ambit of the Law, and thus sniff out anti-competitive behaviour to the greatest extent possible.

In a similar vein, the substantive obligations imposed on e-commerce companies and service providers are far-reaching. Broadly speaking, there are [two primary obligations](#) that such companies must comply with: firstly, the obligation to protect consumer interests, and secondly, the obligation to operate legally. The first obligation encompasses a prohibition on promoting bundles of goods and/or services as a default sale option and targeting consumers' personal characteristics in certain advertising contexts. Furthermore, platform operators must accurately identify and, where necessary, report the identity of third-party sellers, alongside their [business and tax information](#). Consumer rights provisions under the first obligation include, chiefly, the rights to know and choose: platforms must provide comprehensive information about their products, and must refrain from making false or misleading statements about such products. Meanwhile, the [second obligation](#) mandates that e-commerce businesses and platforms refrain from abusing market dominance and restricting competition.

The Law has caused such retailers to collect, store, and disclose information about products to a far larger extent. However, the Law was not seen to be very disruptive to the e-commerce industry, and, in certain cases, merely legislated for actions that were already being undertaken by many e-commerce companies.

The Anti-Monopoly Law:

The Anti-Monopoly Law is far more ambitious and wide-ranging than previous such laws, especially following its [amendment](#). The Law was originally passed in 2008, but received significant amendments in 2021, following Operation Cyber Sword. The amended version of the Law has been in force only since 1st August 2022. For present purposes, the relevant and significant changes included in the amended version of the Law are increased SAMR powers for merger reviews and a strengthened penalty regime.

Where merger reviews are concerned, the Anti-Monopoly Law provides for 'call-in' powers for transactions that [do not meet the minimum threshold](#) for such powers to be exercised. 'Call-in' powers refer to the ability of regulators to temporarily halt a proposed transaction in order to examine whether that transaction is lawful. Traditionally, such powers can only be exercised where the monetary value of a transaction meets a minimum threshold.

However, the Anti-Monopoly Law makes it possible for the SAMR to 'call-in' transactions that do not meet that threshold, notably in the case of so-called 'killer acquisitions'—where an incumbent attempts to purchase an innovative target in order to discontinue the target's innovative efforts. The impact of the provision might be to provoke some uncertainty for buyers, and this may, in turn, decrease transactional volume in China.

The Anti-Monopoly law has also clarified many aspects of the Chinese merger control regime. Firstly, it has introduced a [classification system](#) for merger reviews, which will presumably classify transactions by their monetary values, and dictate levels of review accordingly. Secondly, it has [strengthened](#) the SAMR's powers of review where, for instance, deals are likely to impact citizens' livelihoods. This is a concrete step towards ensuring that regulators have sufficient powers to promote deals that may threaten 'common prosperity' within China.



More importantly, the amended Anti-Monopoly Law makes provisions explicit for abuses of dominant market positions in the digital sector. The original Law, under Article 22, already [forbade](#) businesses from selling commodities at ‘unfair’ prices, implementing discriminatory pricing for different buyers, and refusing to trade with a counterparty without justifiable reasons. The [amended Law](#) now clarifies that businesses with a dominant market position [cannot](#) ‘use data or algorithms, technology and platform rules to abuse their dominant market position’ in any of the aforementioned ways. This strictly limits the extent to which technology firms can defend themselves if found to have abused a dominant position.

Lastly, the amended Law significantly raises the penalty payments that firms must make if they are found to have breached the Law. Specifically, the Law stipulates that the ‘persons-in-charge’ of a company found to have concluded (and not necessarily implemented) an anti-competitive agreement may be personally liable for such an agreement, and [may face fines](#) of up to RMB 1 million (or approximately \$150,000). Fines in relation to a failure to notify regulators of a transaction have also been drastically increased: previously at RMB 500,000 (approximately \$75,000), the amended Law provides for a [ten-fold increase](#) to RMB 5,000,000 (approximately \$750,000). Additionally, in cases of ‘extremely severe’ violations that lead to ‘extremely bad’ impacts, the SAMR is entitled to charge two-to-five times the regular fine for normal violations.

The Anti-Monopoly Law in Practice:

The Supreme People’s Court of the People’s Republic of China (SPC) has been reluctant to strictly enforce the Anti-Monopoly Law (or, at least its [original version](#)—the amended Law entered into force on 1st August 2022, and thus remains without judicial guidance).

Enforcement of the Anti-Monopoly Law has been exclusive to clear-cut cases, where ‘[dominance is all but a slam dunk](#)’. Importantly, in [Qihoo 360 v Tencent](#), the SPC found that Tencent did not have a dominant market position. Article 19 of the Law stipulates that such a position can be found when a firm has a market share over 50 percent. It was therefore quite surprising that Tencent—with a market share of 80 percent at the time—was not found to have a dominant position. The SPC’s judgment in that case sets a very high bar for finding that a firm has a dominant market position. Indeed, the judgment seemed to turn on the lack of anti-competitive effects stemming from Tencent’s purportedly abusive practices, which meant that the case was not as clear-cut as may be thought.

Contrastingly, when the Law was [enforced against Alibaba](#), the firm was made to pay RMB 18.228 billion (approximately \$2.75 billion)—the highest ever fine resulting from the Law. In that case, there was a clear abuse of Alibaba’s market dominance—the [firm compelled counterparties](#) to sell exclusively on its platforms. Further factors, such as the firm’s control over prices, its financial resources and technological superiority, and weak bargaining position of counterparties, were also taken into consideration.

Crackdowns on Tech Sub-Industries



Fintech

The fintech sector was the first to be hit with the crackdown after the government's interference with Ant Group. The regulation of financial services has been spearheaded chiefly by the People's Bank of China (PBOC), which has [criticised](#) online platforms for operating without licences and violating arbitrage rules. Indeed, the development of the fintech market in China has come through the integration of financial services onto the platforms of tech giants like Alibaba, JD.com, and Tencent. All of these tech giants initially operated outside the securities and banking sectors, meaning that their fintech business fell outside the purview of scrutiny for regular commercial banking.

Additionally, tech firms were able to [monopolise](#) the commercial banking sector by operating algorithmic systems driven by real-time consumer data, which Chinese banks were unable to match. The evaluation of creditworthiness by fintech companies functioned much more effectively than traditional banks, becoming a reason for major competitive imbalance in financial services. Aside from this, the fact that a substantial level of share ownership in Chinese tech giants is in [US capital markets](#) further concerned the Chinese government over control in the banking sector. As such, the regulatory response has crucially overhauled fintech regulation to more closely resemble traditional financial regulation.

Notably, fintech companies are required to create financial holding companies that adhere to minimum capital requirements, adequately ring fence against contagion, and meet strict risk management guidelines. More specifically, the China Banking and Insurance Regulatory Commission (CBIRC) brought about an [important change](#) to microloan rules whereby online lenders must contribute 30 percent of the funding for loans they offer in partnership with traditional banks. This reforms the onus of credit risks, as fintech platforms [previously provided approximately](#) 20 to 40 yuan for every 1,000 yuan of loans or just 2 to 4 percent. Fintech partnerships with traditional banks were also further limited by a new rule that regional banks can only serve customers within their borders, preventing them from leveraging online platforms to expand nationwide.

Separately, the cryptocurrency industry, which is considered as part of the wider fintech sector, has continued to be outlawed in China. [Chainalysis](#) data found \$50 billion worth of cryptocurrency left East Asia between 2019 and 2020—of which the majority was believed to be Chinese capital. The [regulation of cryptocurrency](#) is viewed largely as a capital control scheme to uphold the \$50,000 limit for the purchase of foreign currencies in China in a fiscal year. By preventing the outflow of capital from wealthy Chinese investors, the cryptocurrency bans encourage domestic wealth contribution and taxation.

Moreover, amidst the sweeping attempts to reassert authority over the tech giants involved in fintech industry, the integration of the blockchain-based digital yuan can be [analysed](#) as a state-backed effort to strengthen control over the monetary system. The mobile payment market, controlled up to 95 percent between Alipay and WeChat Pay, is threatened by the digital yuan's link to electronic wallets rather than bank accounts. The PBOC-issued digital currency is currently handled through banks and online platforms, but the [ability](#) of the PBOC to provide lower transaction fees than private sector providers may reduce the market influence of the likes of Alipay and WeChat Pay.



Insurtech

As an adjacent sub-industry to fintech, insurtech was [hit](#) with regulations on improper marketing, unfair pricing, and privacy protection on short notice in August 2021. The CBIRC's so-called [rectification project](#) mandated for internet insurance providers to investigate and correct their internal issues before the end of October 2021. Most importantly, the crackdown aimed to target online insurance businesses operating without licensing. Furthermore, rectifications focus on providers expanding offlines service capacities, constraining excessively high fees, and eliminating abuse of user information.

E-Commerce

China currently boasts as the world's largest e-commerce market with about [750 million](#) active internet users. In the new antitrust environment, the newly empowered key regulatory state authorities such as the State Administration for Market Regulation (SAMR), the State Tax Administration (STA), and the CyberSpace Administration of China (CAC) drafted new [aggressive regulations](#) to address anti-competitive behavior in the e-commerce market as well as address concerns of monopolistic prices and counterfeiting. With monopolistic behaviour being the main focus of Chinese regulators, China proposed new legislations and administrative guidelines, making substantial [amendments](#) to the national anti-trust law to increase penalties for violations, and launching [a new anti-monopoly secretariat](#) under SAMR to investigate and enforce anti-monopoly violations against tech companies.

Following the recent record fines of \$2.8 billion and \$530 million levied against [Alibaba](#) and [Meituan](#) respectively for anti-competitive violations, the Chinese State Council's [five-year plan](#) promising to tackle tech monopoly in the digital economy, and recent [statements](#) from the head of SAMR to strengthen anti-trust violations enforcement, points to a rough future for not only e-commerce companies but the digital economy as a whole.

Edtech

As part of a wider clampdown on the [\\$100 billion](#) private education sector, China's Central Committee and State Council [implemented](#) the "[Guidelines for Further Easing the Burden of Excessive Homework and Off-campus Tutoring for Students at the Stage of Compulsory Education](#)". The reforms, which were aimed at alleviating education inequality and affordability, banned education companies that were teaching school curriculums from earning profits, raising foreign capital, or listing on public capital markets.

Overall, the guidelines laid out a total of 30 measures on the education sector. From these, the most impactful policies against edtech companies include a ban on teaching school subjects on weekends and holidays as well as a restriction on classes later than 9pm on weekdays. Additionally, there has been a blanket ban on online courses for pre-primary school children aged under six years old. The Chinese authorities have also been continuously [re-evaluating](#) companies in the education industry to monitor whether they have properly restructured into non-profits and met the new requirements in order to maintain education licences.

The concentrated reforms on edtech arrived in the context of an investment drive into the



industry during the Covid-19 pandemic, as demand for additional online test preparation surged amidst distance learning at schools. The new regulations had the immediate impact of [lifting](#) potential initial public offerings from edtech unicorns like Yuanfudao, Zuoyebang and Tencent-backed Spark Education off the table. Moreover, already publicly listed edtechs like New Oriental Education and Technology Group and TAL Education Group respectively experienced up to 86% and 93% losses on the year. Much of the [analysis](#) on the rationale for the education crackdown has singled out the Chinese government's concerns regarding the demographic crisis, as May 2020 [census data](#) unveiled a startling severe slowdown in birth rates. With the regulations aimed at lifting the intensity of the highly competitive education system in China, it is thought families will fear less of a financial burden for their children to succeed.

Entertainment

The wider entertainment sector, encompassing gaming as well as online streaming, has been at the cross-hairs of the Chinese government's cultural crackdown alongside tech reforms. The limitations on online freedom, particularly amongst the Chinese youth, is seen as crucial to reestablishing great political and ideological security for the CCP.

The most prominent regulation to come out of the entertainment industry has been the [policy](#) restricting online gaming to 3 hours-a-week, with minors only allowed to play on Fridays, Saturdays and Sundays. This rule has been enforced by the [implementation](#) of real-name registration systems and login requirements on gaming platforms that control gaming hours. Prior to the rules, Chinese internet authorities were already pressuring tech giants by labelling gaming as "[spiritual opium](#)" and subjecting companies to [stringent licensing reviews](#) for new games releases.

Outside of gaming, the Cyberspace Administration of China has tackled what it labeled as "toxic idol worship" of celebrities in the entertainment sector. Online fandom culture in China has seen the country's youth support celebrities despite [investigations](#) by the government of tax evasion and sexual assault. The concerns for the party's ideological dominance over the youth population are clear: for example, in January 2020 after confirmation of the human transmission of COVID-19, the [fan network of Zhu Yilong](#) was able to mobilise funds to purchase more than 200,000 protective masks in one day. The potential for social mobilisation against the government is thus seen as a legitimate risk.

The measures taken to respond to the online fandom culture further limit the profitability and growth capacity of players in the platform economy. The fandom market has an [estimated](#) value of over \$15 billion with expectations that it would reach \$21.6 billion in 2022.



Key Technologies and Competition

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Overview

In the last few decades, China's rapid technological advances have contributed to the country's significant economic growth as well as their expanded geopolitical influence. For the United States and its allies and partners, Beijing's growing economic and political influence threatens many of their core values and interests. While the US is still considered the technological powerhouse of the world, Beijing has made huge investments and implemented policies which have produced an overarching extraordinary record progress in technology. Indeed, China is no longer playing 'catch up with the West' in technology advances but surpassing and even eclipsing the US in certain technologies. In this section, we examine key technologies in a broad context of Beijing's global technology ambitions, achievements, obstacles, and how these dynamics are shaping contemporary geopolitical competition.

5G

Since the launch of the Digital Silk Road (DSR) initiative in 2015, Chinese authorities have pushed to promote the adoption of 5G technology, both domestically and abroad. A quick look at the numbers reveal that these efforts have paid off with key players like Huawei and ZTE accounting for [41% of the global 5G infrastructure market](#) – a figure which stands in stark contrast with their American counterpart Cisco Systems's less than 10% share. Given 5G's far-reaching applications in various industries, it is predicted that the technology will contribute [\\$220 billion to the Chinese economy by 2030](#) with the top five sectors using 5G are most likely to be healthcare, smart utilities, consumer & media services, industrial manufacturing, and financial services. For instance, 5G could enhance the reliability of autonomous vehicles by decreasing time lags in data delivery. It could also facilitate the automation of labour-intensive or dangerous industrial processes. Regarding the latter, Shanxi province is developing [5G coal mines](#). The mines operate on underground networks developed by Huawei and China Mobile, allowing for remote inspections and automation of mining activity through remote-operated drilling machinery. Given the importance of the manufacturing and industrial sector for China's economy, one can expect to see [increases in private-network revenue](#) for companies involved in 5G deployment, with forecasts suggesting that it will rise by 60% this year and top \$5 billion by 2025. Indeed, Beijing has set out clear plans to realise this level of progress with the ["Set Sail" plan](#) that seeks to expand the number of 5G users in the countries to 560 million by 2023 which corresponds to a subscriber rate that exceeds 40% of the population. For major industries, the government seeks to build over 3,000 private 5G networks by 2023 thereby achieving a penetration rate that exceeds 35%.

A look outwards, however, reveals that it's not all smooth sailing for Chinese telecom giants. With the US leading the charge against China's 5G expansion, there are concerns revolving around data privacy and security issues, coupled with concerns of unfair competitive advantages and commercial interest. The primary accusation against Chinese telecom companies is that of potential cyber espionage as they must comply with the 2017 National



Intelligence Law, which legally requires them to [“support, assist, and cooperate with”](#) the state’s intelligence-gathering bodies in the interest of national security. Some contend, however, that the interpretation of how this law impacts the company’s services abroad is [misguided](#) as “such obligations should only be fulfilled by the ICT companies directly operating within Chinese territory rather than their overseas subsidiaries.” Therefore, when operating abroad, the companies will instead be subject to The Code of Conduct for Overseas Investment and Operation of Private Enterprises which would require them to comply with national/regional laws and regulations. A [review](#) by law firm Clifford Chance similarly concluded that nowhere does the Chinese law allow for the state to compel telecom companies into behaviours that could compromise network security. Another concern foreign governments have with Chinese telecom companies, especially Huawei, is the [tax breaks worth \\$75 billion](#) that are granted to them by the government, which may give them undue influence over the company. However, the practice of governments granting funds to support emerging technologies’ R&D is nothing out of the ordinary. Additionally, if one accounts for the fact from 2009 to 2018 the total amount of direct grants from the Chinese government was worth the same as [just 0.3% of the company’s total revenue](#) during the same period, i.e, \$514 billion, it is clear that accusations of unfair competitive advantages are not well-supported. Indeed, Huawei’s R&D expenditure is among the largest in the world at [\\$15 billion in 2018](#) – an R&D budget rivalling those of Alphabet or Amazon.

Thus, although the US has limited trade with the company and urged its allies to follow suit – of which many already have, including [Australia](#), [Japan](#), [the UK](#) and [France](#) – it is worth questioning if the security concerns may be somewhat blown out of proportion, or at least intrinsic to the technology itself. Additionally, it is also worth considering where the US really would be better off without technological exchange with Chinese companies. The evidence suggests that the banning of Huawei’s products [will likely set back US telecom firms’](#) development of 5G by several years and indeed with Chinese companies turning inwards foreign firms will likely get less access to China’s vast markets and also less Chinese investment in foreign markets. This will inevitably result in economic losses on both sides and if such trade decisions continue to be dictated by non-market factors Chinese firms may begin questioning the importance of abiding by international regulations and free-trade principles to begin with. Finally, if animosity between the US and China heightens we may witness a [“digital iron curtain”](#) emerge which would compel countries to choose sides thus triggering a high-tech cold war.

Semiconductors

In contrast to their tiny–and indeed at times even nano-sized–frames, semiconductors have immense geopolitical importance. In 2020, semiconductors were the [fourth most traded product worldwide](#), and the industry as a whole was then worth some \$400 billion. In 2021, semiconductor [exports](#) soared from \$2.1 billion to \$4.14 billion—a 97 percent increase.

Semiconductors are ubiquitous in modern hardware, so much so that the semiconductor shortage prompted by supply-chain constraints arising during the COVID-19 pandemic caused swathes of firms, such as Sony, Toyota, and Apple, to significantly delay product launches and report [billions in quarterly losses](#). From a geopolitical perspective, however, it isn’t just their commercial importance that is key: semiconductors are also used in industries that are vital to



national security, such as artificial intelligence, military, and aerospace. The Biden administration, for instance, has acknowledged that semiconductors are ‘[crucial to \[the US’s\] national security](#)’, and several other governments worldwide have made similar statements.

The CCP is no exception, and has [set out](#) to achieve 70 percent self-sufficiency in semiconductor production within a decade. The industry for semiconductor fabrication is highly concentrated: [just four or so companies](#) worldwide—notably TSMC, Samsung, Globalfoundries Inc., and United Microelectronics Corp—account for the majority of global chip production. A lack of diversity in semiconductor manufacturing laid the groundwork for an acute shortage. Troubles in semiconductor supply chains caused disproportionate production delays, which quickly spread globally. To make matters worse, semiconductor supply chains are highly complex, meaning that a complication in one step cascades to others. Potential delays or complications [could](#) come from the process of gathering rare earth materials, designing and manufacturing electrical components, assembling and testing those components, and shipping them out to consumers. Each step relies heavily on the one preceding it, and each step also requires highly sophisticated machinery that not all manufacturers can get their hands on, as will be discussed below.

The troublesome mix of unprecedented surges in demand, a highly concentrated fabrication market, and supply chain constraints prompted huge annual growth in China’s 2020 annual semiconductor sales, which [rose](#) 30.6 percent to \$39.8 billion. In China, there are [four primary](#) distinct segments of the semiconductor supply chain: fabless, integrated device manufacturers (IDM), foundries, and outsourced semiconductor assembly and test (OSAT). Firms in each of these sectors had [annual growth rates](#), in 2020, of 36, 23, 32, and 23 percent, respectively. In the market as a whole, China has one of the fastest growing compounded annual growth rates (CAGR) globally, at approximately 30% in 2020. Yet there is still a long way to go for China to dominate: as of 2020, it held only a 4 percent [market share](#) globally, whereas the US held a 47 percent share.

It is expected that China’s market share will grow significantly. The CCP has the power to back, and even own, firms to a degree that is virtually impossible in the markets of its main competitors in the West as well as in South Korea and Japan. New semiconductor fabrication facilities in China are, at times, [wholly state-owned](#), with further backing from local government funds and national integrated circuit funds. Between 2014 and 2018, four of China’s most prominent state-backed semiconductor firms received \$4.85 billion in [below-market loans](#) from Chinese financial institutions. As a result, building and operating semiconductor fabrications in China is [significantly cheaper](#) than doing so in the US: 37 percent cheaper, to be precise. Moreover, China plans to fund 28 new fabrication facilities in 2021, with \$26 billion committed. If China’s semiconductor market continues its growth trajectory—at an annual rate of 30 percent CAGR—it’ll [account for](#) 17.4 percent of the global market by 2024.

But it will by no means be smooth sailing for China from here on out, both in terms of establishing self-sufficiency and gaining an enlarged share of the global market. Importantly, Chinese chip manufacturing, though massive in sheer volume and revenue, lacks the level of sophistication necessary to genuinely compete with firms such as TSMC, Samsung, and Intel. Specifically, China presently [cannot manufacture](#) chips more advanced than 14-nm node, whereas 5-nm node chips are used in the latest smartphones. For such chips to be manufactured,



extreme ultraviolet lithography (EUV) machines are essentially a necessity, and only a single Dutch firm—ASML—is [able to make such machines](#). Although TSMC, GlobalFoundries, and SMIC—a leading Chinese manufacturer—have recently developed 7-nm node chips using deep ultraviolet lithography (DUV), this process comes with [heightened costs and complexity](#), alongside tighter manufacturing restrictions, which lengthen manufacturing timescales. The DUV process is also novel and unestablished, meaning manufacturers are still to sort out the finer kinks that need ironing out. Furthermore, much to China’s displeasure, the US has [banned](#) ASML from selling EUV machines to the country, meaning it will be extremely difficult for the Chinese to improve the quality of their chips. Similarly, the US has also included a number of prominent Chinese manufacturers, including SMIC and Huawei, on its [Entity List](#).

All in all, China has made significant progress and will continue to make progress in becoming a self-sufficient semiconductor manufacturer. Nevertheless, there are and will be many obstacles on the road to achieving self-sufficiency, and even more where gathering more market share is concerned.

Artificial Intelligence

In 2021, China [produced](#) approximately a third of all AI journal papers and citations worldwide, and in terms of commercial prospects, the country accounted for nearly a fifth of global investment funding, attracting \$17 billion for AI start-ups. Although China was not one of the pioneers of AI, the nature of the industry means that it has been able to grow rapidly and get ahead. AI technology has an [open science nature](#), which means that unlike most sophisticated technologies, AI can be developed by building on essential algorithms that are published in the public domain. Patents do not yield a durable advantage and instead, AI progresses through a ‘virtuous circle’ of firms refining their products based on user data. Therefore, late movers are able to get ahead, provided there is a steady supply of data – something the Chinese have in significant quantities given their sizable population – and a policy environment conducive to supporting such research. Regarding the latter, the Chinese state has worked hard to promote the domestic AI industry in recent years with several initiatives like the “[Action Outline for Promoting the Development of Big Data](#),” “[Made in China 2025](#),” and the “[Next Generation Artificial Intelligence Development Plan](#).” Together, these measures not only encourage the adoption of AI directly, but also signal to start-ups and the research community that AI innovation is something that is being actively supported and valued by the government and therefore likely worth investing in. Furthermore, China’s weak data privacy regulations have helped the AI industry catch up. For example, if firms focusing on visual or facial recognition are granted access to data from the state’s [extensive surveillance system](#) they will be able to test their algorithms far more rapidly than would be possible in countries with stricter laws on data protection.

Another critical asset for AI innovation is highly-skilled computer scientists and engineers who can move beyond emulating the findings originating in the US and find ways to incorporate AI into major industries like automotive, manufacturing, and healthcare. The Chinese government recognizes the need to specialise and is encouraging companies to pursue ventures in subdisciplines of AI [in exchange for](#) “preferential contract bidding, easier access to finance, and sometimes market share protection.” These efforts have resulted in a group of fifteen ‘AI



national champions' including Chinese tech giants like Baidu (autonomous vehicles), Tencent (medical imaging), Alibaba Cloud (smart cities), iFlytek (voice recognition), SenseTime (intelligent vision), and Xiaomi (home automation). Evidence suggests, however, that China will need to continue to actively invest in its AI industry to propel it forward, specifically with respect to [recruiting AI talent](#). Although a third of the world's top AI specialists are from China, only a tenth actually work in the country. Equally, the state will also need to be [careful with its subsidies](#) as a study by Deloitte estimates that 99% of self-styled AI startups in 2018 were fake and research by Zeng Jinghan from Lancaster University corroborates that some firms falsely claim to be conducted AI R&D to receive state funding. Thus, if China continues emphasising the importance of original research for AI applications, invests in talent recruitment plans for returnees, and is more vigilant regarding who receives government grants, we can expect to see continued growth. However, even if all these requirements are met, one key external challenge could still stymie the Chinese AI industry: the supply of advanced computer chips. Currently, almost all such microprocessors are produced by the US and are subject to trade restrictions that were first enacted by Donald Trump and have been [continued by the Biden administration](#). Without a steady supply of this essential hardware, the Chinese AI industry is likely to [hit a plateau soon](#) with estimates suggesting that China could take nearly a decade to develop the expertise to design its own computing chips.

Biopharma

China is the world's second-largest pharmaceutical market with an ageing population of 1.4 billion. Coupled with high smoking rates and air pollution, as of 2020 the country accounted for [a third of cancer deaths globally](#), and yet, [only four of the 42 cancer drugs](#) approved globally are available in China. A combination of such unmet medical needs and the significant growth potential for the biotech industry has spurred the Chinese government into reforming its extant regulatory processes and investing in talent recruitment plans. In 2015, China's National Medical Products Administration (NMPA) began [reforming its new drug-approval procedures](#) by introducing priority reviews to enhance efficiency as applications at the time could take anywhere between 15-40 months to get processed. Post reform, the average review time was reduced to 2-10 months with the proportion of drugs under priority review [increasing from 14% in 2016 to 77% in 2019](#), thus reducing the registration time for new biopharmaceuticals and boosting the overall rate of R&D within the industry. Additionally, these regulatory changes have also served to enhance the industry's competitiveness with China [joining](#) the 'International Council for Harmonisation of Technical Requirements for Pharmaceuticals for Human Use.' This accession acts as an assurance that the Chinese biotech industry meets international standards thereby allowing the country to integrate into the global biopharma ecosystem.

This is not to say that China has not previously been a key player in the wider biotech industry. Indeed, [80% of the world's active pharmaceutical ingredients](#) (APIs) are manufactured in China. However, Beijing's latest push is to transform the country's biopharma industry from one that focuses primarily on generic drug production to one that fosters innovation. To facilitate this, the state has implemented initiatives like the '[Thousand Talents Plan](#)' to recruit back Western-trained professionals, of which [60,000](#) are estimated to have returned between 2008 and 2016. This plan is estimated to cost China [between \\$550 million and \\$1.1 billion](#) over



the decade which illustrates the levels of investment Beijing is willing to put into spurring innovation.

Additionally, the state is [reducing the prices of generics](#) to encourage the industry to fund more innovative medicines while also [demanding lower taxes from innovative companies](#). Suffice to say these efforts have paid off with the market value of publicly listed ‘biopharma innovative players’ in China rising from [\\$3 billion in 2016 to over \\$380 billion in 2021](#) across the Nasdaq, Hong Kong Stock Exchange (HKEX), and Shanghai Stock Exchange Science. Significantly, biotech firms originating from China accounted for [\\$180 billion](#) of this total. A few major players in the industry include BeiGene, HutchMed, Connect BioPharma, Gracell Biotechnologies in addition to foreign multinationals like Siemens Healthineers, Boehringer Ingelheim, AstraZeneca, and Pfizer who are continuing to invest heavily to meet the rapidly expanding Chinese demand.

China’s ability to integrate AI into biotech R&D processes will be pivotal in ensuring China’s continued growth. Given that the country has relatively [weak data protection laws](#), it is likely that the Chinese will have access to significant amounts of health data from a vast population which will enable them to attain an advantage in training new algorithms to aid biomedical applications. Indeed, the Chinese national health care system is believed to potentially have biomedical data on some [600 million patients](#). Acquisition of data on this scale in the age of AI could have significant implications for the economic competitiveness of foreign industries. Recognizing this, the Chinese government is becoming increasingly aggressive about protecting their databases and has [developed rules](#) to govern the sharing of this strategic national resource. Indeed, in 2018 these were exercised to halt many [high-profile scientific collaborations](#) including one with Peking University and the University of Oxford. Observing the Chinese government’s drive to get ahead, authorities in countries like the US are worried about intellectual property and biomedical data theft and many American life sciences institutions have already been subject to [“non-traditional intelligence collection by Chinese actors.”](#) For example, during the pandemic, two Chinese hackers were [indicted in the US](#) for attempting to obtain coronavirus treatment related intellectual property and [similar incidents unfolded in Spain](#) where Chinese hackers were allegedly trying to steal vaccine research data from Spanish labs.

Another potential risk stemming from China’s biotech industry includes leaks from laboratories, a hazardous outcome that played out as recently as 2019 when 3,000 people in China were [infected by a leaked bacteria](#) called Brucellosis. Furthermore, with the advent of synthetic biotech, the development of highly sophisticated biological weapons can not be discounted as a potential outcome. Perhaps the most pressing potential adverse outcome for the Chinese government’s commercial interests, however, will be the failure of their own researchers to comply with international standards which could set the whole reputation of the industry back – a risk that was exemplified by a Chinese scientist making global headlines for creating the [first genetically altered babies](#) using CRISPR gene-editing technology. While the government made efforts to rectify this incident by sentencing the scientist to [3 years in prison](#), it is worth considering the [door](#) this premature development might have opened.



Electric vehicles

Electronic car batteries are a commodity of the future with many of the big nations transitioning toward electric vehicles as a means to reduce emissions. The UK has set a 2035 target for a [78% reduction in emissions](#), announcing that the sale of petrol and diesel cars will be banned, whilst the US has commissioned thousands of cars from Tesla to be used as official government vehicles. Due to this, there is a worldwide race to develop the most efficient electric car battery, the importance of this is owed to the under-development of electric car charging spots.

At the present moment, China is leading the race. Industry leaders CATL, and CALB are both Chinese companies. Along with the up and coming company SVOLT, Chinese electrical car battery companies are [attracting large amounts of investment](#). CATL has established its dominance on the market, already supplying the likes of Tesla, General Motors and BMW. [TA recent report by McKinsey](#) predicts China's electric vehicle (EV) sales will have an annual growth rate of 24%, and that it will likely be the biggest global EV market in decades to come. Already accounting for approximately half of the global share of the EV market, this demand can be attributed to the Chinese government's drive to not lose out on first-mover advantage in the global transition to greener technologies – an aspect particularly relevant to the country given its exceedingly high [air pollution rates](#) – while also addressing its energy security concerns stemming from their [dependency on imported oil](#).

To promote its EV industry, China has made significant efforts to drive down prices and boost domestic consumption. A plan outlined by the government titled the [‘Made in China 2025 plan’](#) discusses how China will become independent in industries such as electric car batteries. Local governments have been recorded to support companies like CATL with millions of dollars. The Qinghai local government contributed around \$30 million between 2015 and 2017. Innovation like this explains why China has 14 times the capability in electric car battery manufacturing in comparison to the US. While in other car markets, EVs are [45-50% more expensive](#) than gas-powered vehicles, Chinese customers enjoy [a mere 10% price increase](#) in their EVs due to smaller vehicle designs and lower manufacturing costs. Indeed, the [most popular electric car](#) in the country as of 2021 was a compact, four-passenger EV that retails at \$4,500, making EVs truly accessible to China's expanding middle-class. To further enhance their appeal, the central government will also be extending their ongoing purchase-tax exemptions into 2023 – a decision that creates [tax cuts worth 100 billion yuan](#). Additional incentivizing measures include granting licence plates for [free](#) to new EV owners in cities like Shanghai and investing heavily in building [charging infrastructure](#). These initiatives also contribute to the country's promise to achieve carbon neutrality by 2060. For instance, [Geely](#), a major EV manufacturer, “used 15% of recycled steel plate material and 25% of recycled aluminium in the car model ZEEKR 001. Similarly, XPeng developed and utilised green technology such as [photovoltaic](#) panels in the manufacturing process, thereby converting solar energy into electricity without pollution. Other key players include Byton, BYD, SAIC, Nio, Li Auto and when one accounts for joint ventures this list expands to include industry names like BMW, Daimler, and Toyota. This interplay of subsidies, innovation, and foreign investment has not only made the domestic EV market robust, but also resulted in China becoming the [world's largest exporter](#) accounting for approximately 60% of EV production.

As mentioned earlier, China is keen to reduce all resource dependency, especially with respect to energy security, and so preempting the spike in demand for precious metals for EV battery



production, Beijing has long been strengthening its diplomatic ties and investing in resource-rich countries. Electrical batteries are seen to be an industry of strategy, important to the Chinese government. As evidenced by [subsidies provided](#) for foreign electrical car companies that collaborate with local Chinese companies concerning technology. The industry has been helped by China's relationship with the Democratic Republic of Congo, a country blessed with cobalt, which is imperative for CATL batteries. Earlier this year CATL acquired a quarter of the [Kisanfu mining operation](#), where they'll be able to access some of the purest cobalt reserves on earth. Cobalt is central in allowing electrical car batteries to run longer without charge. Chinese foreign investment is securing its dominance in the market for years to come, achieved by capitalising on dormant investments abandoned by the US. Their carefully planned strategic manoeuvres have led to Chinese investment responsible for the ownership of 78.9% of Congolese cobalt mines. Congo is responsible for roughly [70% of the world's cobalt production](#).

[Reports of human rights abuses](#) against the Congolese, however, have begun driving some manufacturers away from cobalt and towards the use of nickel in their batteries instead. Here too we see Chinese companies like [Huayou Cobalt and CMOOC](#) taking the lead by investing heavily in the country which has the world's largest nickel reserves at [72 mn](#): Indonesia. These investments make China the largest market producer of nickel. A similar story of market domination plays out in the case of [lithium](#), another metal essential for batteries. These strategic investments have resulted in Chinese battery-maker [CATL](#) controlling approximately 30% of the world's EV battery market, supplying batteries to firms such as Tesla, BMW, Volkswagen, etc. This has already begun to become a major point of concern for Western powers, especially the [US](#). Thus, China's quest for energy security has left the rest of the world reeling in a 'battery arms race'.

Other industry leaders in electric vehicle batteries include South Korea and Japan. Currently, South Korean battery making is responsible for [approximately 30% of the market](#). EV industry leaders such as General Motors and Tesla, are known to purchase batteries from South Korea. President Moon Jae wants to make South Korea the biggest EV battery manufacturer by 2030, overtaking China. They hope to achieve this by finding a proficient alternative to the popular lithium-ion battery. LG has promised over \$20 billion dollars whilst Samsung and SK have committed enough to allow for a combined \$35 billion investment to develop their industry.

Japan is also looking to corner a larger share of the market at the expense of China (and South Korea) by increasing its domestic production capacity. It previously maintained a larger share of the lithium-ion battery market but saw this reduce greatly [from 2015 to 2020](#), and the government is aware that lack of action has led to the flourishing of the Chinese and South Korean electric-car battery markets. Reports indicate Japan plans to secure 20% of the market by 2030. Nissan is working in collaboration with NASA to create a new electric-car battery that can charge quicker, and is lighter, whilst maintaining safety standards. In a manner similar to their Chinese neighbours, Japan's strategy is centred around government support.

Despite calculated efforts from both countries, it is clear that China's dominance is likely to be seriously unrivalled for years to come. China's international investments as well as its domestic production capacity show that they are well in place to control the global market. South Korea and Japan are still heavily reliant on core materials manufactured by China. Rather than threats from the Japanese and South Koreans, the biggest competitor remains the US. Development of



aspects of their climate and energy plan related to electric-car batteries currently poses the biggest threat to China.



Venture Capital & Equity Capital Markets in China

Marko Cem Zerunyan

Overview

Geopolitical uncertainty from the war in Ukraine precipitated a downturn in global markets. However, even before this, Chinese equities were already experiencing a severe drop in valuation. Various industries—most significantly tech—have felt growing investor uncertainty amidst regulatory crackdowns and stringent lockdown measures. By March 2022, the Shanghai Composite hit an annual low whilst overseas-listed Chinese tech stocks tanked to a [\\$1 trillion](#) loss in capital. Despite the chaos in capital markets and the tech crackdown, venture capital activity in China remained at record levels in 2021. In Q2 2021, Chinese startups raised \$22.8 billion, the fourth best quarter in the last five years excluding Q2 2018, Q4 2020, and Q1 2021.

But the record numbers of Q2 2021 fail to reflect the fact that at the same time, China underperformed against other national fundraising records in Latin America, Canada, India, and lastly, the USA, which raised a high of [\\$70.4 billion](#) in the same quarter. Following the record year of 2021, the fundraising volumes in Chinese venture capital has plummeted to [\\$3.5 billion](#) in the first quarter of 2022, with the fast-growing Indian startup sector [luring](#) potential investors in China away from the risky regulatory market. Ultimately, for foreign investors, which traditionally have played a key role in China's venture capital market, the biggest goal is anticipating which tech sub-sectors the Chinese government will back and prioritise for the country's aim of "technological self-reliance".

China's transition to a policy of technological self-reliance has also represented a reduction in the influence of foreign investment in Chinese markets. In the past decade, Chinese government guidance funds have deployed over [\\$900 billion](#) in venture capital and realigned the direction of investment activity toward strategic growth sectors. This drive for state-incentivised technological innovation has recently led to an uptick in Chinese equities in a period where global IPO activity is at a notable low, only a year after the post-lockdown highs of 2021.

China's "VC-Industrial Complex"

Low investor confidence has made the environment for capital raising in China from private equity or venture capital difficult in 2022. However, another key factor playing into the capital raising environment is the prominence of government-led investment capital. Research from Zero2ipo [indicates](#) that state and local government funds accounted for more than 33 percent of capital raised in limited partnerships in China, with more than 20 vehicles for "government guidance funds" being formed in 2021 alone.

The government guidance fund is a vehicle through which the CCP can restrict the "[disorderly expansion of capital](#)" and direct strategic capital into industries favoured by President Xi Jinping, such as artificial intelligence, biotechnology and advanced manufacturing. By design, it is structured to eliminate the lack of industry know-how and bureaucracy that hampers



conventional industrial policy and subsidisation. This is accomplished by the government leading the fund formation process, but confining its sponsorship to between twenty and thirty percent of the fundraising capital, while inviting the remaining funds through contributions from "[social capital](#)".

Government guidance funds diverge from standard state subsidisation policy as professional asset managers are recruited to manage funds as general partner (GP). Specifically, the process of capital deployment in guidance funds involves the creation of sub-funds where the guidance fund (the state) becomes a limited partner (LP), whilst the appointed asset manager takes over the role of GP. Hence, the difference of guidance funds from traditional venture capital funds is that the originator of capital—the state guidance fund—does not act as the GP, since this would purportedly facilitate excessive state involvement in any investment decisions.

Whilst it would seem unlikely that the highly interventionist Chinese government adheres to taking the back seat as a LP, market research from [The Economist](#) shows that the largest guidance sub-funds are almost exclusively run by GPs with private sector experience. In contrast, when observing guidance funds outside market hubs like Shanghai, the picture changes. In smaller cities and provinces, investment in sub-funds is dominated by state capital—far exceeding the typically proposed 20 to 30 percent—with minimal co-investment from social capital. In these cities, the GPs of guidance funds are also generally far less seasoned investment professionals, and instead tend to be government bureaucrats.

From the view of ensuring a balanced disbursement of investment across the country, the presence of guidance funds in smaller cities and provinces is beneficial as it makes capital available to businesses located outside of China's market hubs. As of Q1 2020, there were about 1,741 guidance funds that had raised about 4.76 trillion RMB, according to the Centre for Security and Emerging Technology. Yet in the smaller provinces, the desired integration of private sector expertise into these funds is largely absent, because state cash is crowding out private capital.

Aside from crowding out effects, private investors may not find guidance funds appealing as lock-up periods are too illiquid at a standard duration of 10 years. This is a reflection of the government's affinity for long-term policymaking. Conversely, private investment in venture capital is typically modelled for exits within 5 years. Furthermore, when a guidance fund with stakes as low as 5 percent in a sub-fund decides to exit prematurely, it can cause private sector investments in that vehicle to dry out because preferential terms will often allow the guidance fund to dissolve the sub-fund, while private investors are forced to absorb losses.

China's Venture Capital "Winter"

In the past decade, China's venture capital market has experienced a shift from a reliance on private foreign investors (from giants like Sequoia and SoftBank—both early backers of companies like Alibaba and Tencent) to state investors. It is currently struggling to attract any type of investment. Following the year-long tech crackdown in China, numbers from the first quarter of 2022 underlined a [76.7 percent](#) drop-off in fundraising volume in the internet



industry, according to the China Academy of Information and Communications Technology (CAICT). Similarly, capital from US dollar funds into China's venture capital economy has dropped [64 percent](#) year over year according to the Chinese ITjuzi database.

Whilst expected market factors like geopolitical uncertainty, lockdowns, and a global recession have played into the depletion of venture capital, the state involvement in China's startup scene has also deterred investment by distorting valuations. In The Economist's [research](#) into 56 unicorns based in six central and eastern Chinese provinces, it found that 32 companies received capital from guidance funds. From those that initially received state-backing, those companies that were involved in the platform economy faced a sudden reduction in venture capital support as the government's tech crackdown ensued. On the flip side, the readily deployable capital for startups involved in favourable tech sub-industries like semiconductors and AI has created an environment where it is [difficult to determine businesses](#) with true innovative potential, as funds are rushing to speculate on the next unicorn.

Another byproduct of the Chinese state-led venture capital market that concerns private investors is the distortion of talent networking. As guidance funds progressively become the most influential stakeholders in startups, Chinese entrepreneurs have less incentives to connect with other market talent or potential business partners because their priority is to build governmental relations. The guidance fund investment gives startups a window into partnership with state-owned companies and fast-tracked applications to deal with regulatory scrutiny. The lack of private capital and incentive distortion has created an environment of bureaucracy uncondusive to organic innovation.

Nevertheless, there is potential for change in investor sentiment. In contrast to the waves of paused investment from overseas funds, the Chinese affiliate of venture capital giant Sequoia confirmed that it raised close to \$9 billion in July 2022 with the purpose of injecting necessary capital into cash-stripped Chinese start-ups. These \$9 billion marks a [170 percent](#) increase from the lows in fundraising volume from the first half of 2022.

China's IPO Market

The state influence over startups supported by guidance funds has also resulted in a major [reshaping](#) of Chinese capital markets. The Chinese IPO market has been operating at major levels since the beginning of the year—in stark contrast to other leading markets like the New York Stock Exchange—and this record activity in China has occurred despite clampdowns on both domestic and overseas flotations by companies in the platform economy. The equity fundraising levels in the first six months of 2022 have increased by 7 percent year-over-year in China as compared to the [90% dropoff](#) in values of US and European IPOs.

The IPO drive in China is seen as playing a crucial role in the government's technological self-reliance policy, with listings focusing almost strictly on the aforementioned strategic sectors. For companies in fields like semiconductors, the state-backed push for IPOs allows for higher valuations and a short-term injection of capital when the global demand for advanced strategic technologies like chips is at a high. Almost 80 percent of IPOs this year in China have listed



on Shanghai's science and technology-centred Star Market or Shenzhen's tech-focused ChiNext Market rather than either city's major bourses.

The Chinese IPO pipeline in the first half of this year also would not have been possible without the government's [permission](#) for financiers to station themselves in their offices or stock exchanges during the strict lockdown in Shanghai and elsewhere. This unique situation is a clear indication of the strategic priority of aligning capital markets with the Chinese government's future goals of technological self-reliance. And with the recent development of Ant Group bringing their public listing efforts [back to life](#)—crucially, only on Chinese markets—the venture capital and IPO market appears to be on a clear trajectory of statism for the foreseeable future.



Chinese Presence in Africa

Alice Presotto and Caleb Adegbola

Overview

Africa's tech scene is witnessing a flourishing presence of Chinese companies. The country's dominance spans through a wide range of sectors, from the commercialization of Chinese made devices as phones and apps, to the building of data centres and 4G/5G network infrastructures. Chinese presence in Africa is sometimes discussed in relation to the Digital Silk Road, a part of the Belt and Road Initiative which is focused on spreading China's domestic technology worldwide, involving industries such as mobile technology and artificial intelligence. This is achieved through varying avenues such as increased digital cooperation with other nations and increased foreign direct investment. The Digital Silk Road is not a concrete programme or initiative, but can be understood as a vision with a loose mandate to export technologies. One one hand this has meant a vital help for the establishment of the digital infrastructure of many African countries, on the other an undeniable political risk for the digital sovereignty of the continent.

Phone and app market

Chinese phone manufacturers have found their competitive advantage in the African market. Combined, the Chinese companies Transsion, Xiaomi and Oppo [reportedly account](#) for 64% of the smartphone market in Africa in Q2 2021. Transsion, ahead of Nokia, is [leading](#) the market for cheaper feature phones, accounting for more than three-quarters of all such phones sold on the continent in Q1 2020. So far, [Chinese mobile phones](#) have been using Google's Android operating system (OS), however they might switch to Huawei's OS as a result of geopolitical tensions between US and China.

African customers greatly benefit from the lower price point of the Chinese suppliers. Furthermore, Chinese companies produce phones with features targeted for the African market, in particular phones with multiple SIM card slots for African customers who find communicating across networks expensive. While customers are able to reap such benefits, the conspicuous presence of Chinese low-cost products leaves no space for the development of a local industry. Currently, the only completely made-in-Africa smartphone is offered by Mara Group from Rwanda. Some consumers are willing to buy the Mara Phone to support the African economy rather than buying imported hardware. However, after only two years since its opening, the Mara Group's facility in South Africa, one of the two in operation, is set to be [auctioned](#) in 2022. The combination of a slow adoption of the brand in the South African domestic market coupled with lockdowns has caused this closure.

Chinese penetration into the African market is also coming through [social media apps](#), as more and more people own a smartphone. ByteDance's TikTok is becoming a leader in the African market, despite it still being well-behind Facebook. In South Africa, usage of TikTok has [grown](#) from 5 million in January 2020, to 9 million members in March 2022, while in Nigeria, it now has a 31.9 percent market share. In addition, TikTok is giving grants to support African creators developing on the platform. Rising Voices project is an initiative that provides cash



grants for about R1 million and mentorship to guide the content curation for grant recipients' individual TikTok pages.

4G and 5G infrastructure

A [World Bank study](#) found that 'nearly 1.1 billion new unique users must be connected to achieve universal, affordable, and good quality broadband internet access by 2030.' African countries are teaming up with Chinese service providers to scale up their broadband infrastructure. The current leader in building 4G and 5G networks in Africa is the Chinese company Huawei. The company itself, as well as its subsidiaries, [are reported to own](#) approximately 70% of the 4G networks in Africa. Their lead in 5G is also progressing. For instance, in Ethiopia Huawei has [partnered](#) with state-owned company Ethio-Telecom to launch 5G technology in Addis Ababa in May 2022 with plans for expansion of the 5G networks in up to 150 sites within a year.

5G networks provide critical advantages for the African economy, as it speeds up communication flows in the service industries, manufacturing plants, remote healthcare, precision agriculture, as well as facilitating the Internet of Things (IoT). However, this greater connectivity among African countries comes with its downsides. With it comes cybersecurity concerns of data leakages.

Data centres

Various countries in Africa are [relying](#) on Chinese providers for the building of data centres and cloud services. Huawei is contracted for this purpose in Mali, Madagascar, Mozambique, Tanzania, Togo, Zambia, and Zimbabwe. In [Tanzania](#), a data centre was built to host and store data from government and private offices. In Sudan, Huawei is [setting up](#) a data centre for the government, in which all data and digital platforms from foreign servers will be migrated to the national infrastructure. This increases the independence of the government from external servers, since all servers would be located within the country's borders, therefore providing the state with full access to the stored data. However, relying completely on Chinese technology could generate other risks.

TV satellites

The presence of China in the tech infrastructure has been revolving around not only in smartphones and broadband infrastructures, but also in TV satellites. At the Johannesburg Summit of the [Forum on China-Africa Cooperation](#) (FOCAC) in December 2015, the Chinese government committed to the implementation of Satellite TV projects in 10,000 villages in Africa. These devices are meant to [provide](#) international channels in Chinese, English, French, Portuguese, and various African vernacular languages. [StarTimes](#) is implementing the project across Africa to provide affordable and quality digital TV services. The private Chinese media group, [present](#) on the continent since 2007, is now one of the largest digital TV services providers in the continent, operating in over 30 African countries, with over 13 million digital TV users.



This project is part of the broader aim outlined in the Forum on China-Africa Cooperation Johannesburg [Action Plan](#) (2016-2018), of Sino African collaboration to implement village-community-level comprehensive development projects focusing on poverty eradication. It has been widely welcomed by African countries. Zambian President Edgar Lungu [said](#) that Satellite TV can provide access to external information for rural people and therefore making access to information no longer just a privilege to a minority. However, it has also attracted some critics. [CNN](#) in July 2019 raised the concern that such a project would give China "a tighter grip on the continent's communications infrastructure and control over how it is portrayed there in the media."

Fintech

Africa has one of the highest rates of unbanked adults; four percent of unbanked adults were [living](#) in Nigeria in 2017. The lack of financial services, combined with the increasingly widespread use of smartphones is creating the potential for a profitable market in digital payment services. China has the [highest](#) estimated user-penetration rate for mobile payments as of 2022, with Alipay and WeChat Pay dominating the market. China skipped directly from the use of cash to payments via apps, with the use of credit cards never having been widely adopted. This scenario is an expected one in Africa, and which Chinese companies are already experienced in, and therefore are more qualified to tap into this market. Chinese companies have already made their first steps, with Alipay [partnering](#) with Vodacom to create a super-app in South Africa.

Surveillance and AI technologies

China firms are [leaders](#) in the use of artificial intelligence to improve its surveillance capabilities as building software that uses AI to sort data collected on residents. Two Chinese companies Hikvision and Dahua provide [roughly 40% of the world's surveillance cameras](#). This technology is being [exported](#) to Africa, with Chinese developed AI surveillance systems deployed in 13 African countries. In 2018, [CloudWalk](#), a China-based developer of facial recognition software, closed a deal with Zimbabwe to [deploy](#) AI facial recognition technology to build a national database. The creation of the infrastructure for face biometrics has been requested by the leader of Zimbabwe with the [aim](#) of making the election voting process more trustworthy. However, this technology represents a [risk](#) for the civil liberties of the country, because it replicates parts of the surveillance infrastructure that have the capabilities of limiting freedoms, without laws regulating its use. In addition, with access to a larger pool of data with a more diverse racial composition compared to China's, CloudWalk could be able to make its facial recognition systems more precise and applicable to diverse pools of population, which gives the company a clear technological advantage.

Chinese-supported tech education programmes



Huawei is [organising](#) a training programme titled 'Seeds of the Future' worldwide, including in the African continent. The aim is to help the recipient country become an information and communication hub. In Senegal the Chinese company has operated since 2016 through an MoU with Senegal's Higher Education Ministry, and the President of Senegal [acknowledged](#) Huawei's role in ICT knowledge and skills transfer to Senegal. Senegal is one of the countries in the African continent sending students to China for the 'Seeds of the Future' training program. Congo has been [sending](#) 8 to 10 students since 2017 to Huawei HQ in China to attend this program to improve theoretical knowledge and practical skills in ICT.

Digital sovereignty and political risks

African digital platforms and infrastructures are helped by Chinese companies; however, the continent's digital sovereignty has been put in serious risk by the same entities. An emblematic case is the African Union data leakage scandal. In 2012 China built the AU's headquarters and the [computer network](#) for free, while Chinese technicians help maintain the organisation's digital infrastructure. In [2019](#), it was reported that data from the African Union HQ was copied and transferred to Shanghai every day for five years since the building opened. In [2020](#), another leak of information was disclosed, this time involving the theft of surveillance footage from AU HQ meeting rooms, parking lots, and corridors by Chinese hackers. Nonetheless, these claims were dismissed by the Chinese ministry of foreign affairs, [referring to the reports as "false information"](#). These breaches, and the potential transferral of internal sensitive information, has generated considerable worries about the security of the technology that Africa is using for its development, finding itself caught in between Chinese infrastructure perceived as necessary and a threat which it has been unable to avoid thus far.



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