



# The US-China Technology Competition: Inevitability, Development and Impact

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**Abstract.** China uses the latecomer comparative advantages of developing countries through the "Flying geese model", which makes China move up in the global industrial chain. China and the United States have inevitably fallen into the Thucydides trap, which contradicts the U.S. position as the world leader in not only intensive high-tech products but also other economic and political fields. At the same time, due to the fundamentally different national nature of China and the United States, Sino-US relations have been gradually strained since the Obama administration and escalated from trade competition to technological competition during the Trump administration. Currently, this bilateral relationship is still persistent and uncertain. The competition has an impact not only on international trade flows and global supply chains but also on the new world order with the expansion of technological nationalism. China should recognize the reality and respond positively.

**Keywords:** US-China Technology Competition, US-China Relations, International Politics.

## 1 Introduction

The science and technology competition can be considered an upgraded version of the trade competition. In the trade competition, the parties to the dispute will set up barriers to achieving their economic purposes, such as tariffs, export subsidies, bilateral or multilateral agreements, etc., which will often destroy the original international trade flow and cause the fragmentation of the global industrial chain <sup>[1]</sup>. Political and economic factors usually cause modern trade competition. For a government to resist dumping, protect the country's troubled related industries, and ease the cyclical unemployment pressure and other factors, it often sets up protective trade barriers, which are more based on economic factors. In addition, the excessive trade balance between the two countries or for political purposes can also cause trade competition, such as the trade competition between the United States and Japan in the 1980s, successfully curbing Japan's development. This trade competition caused by political factors will lead to mutual retaliation between the two sides and then evolve into a tit-for-tat conflict. However, at the same time, political factors can also end this trade competition. After all, the pain in the economic field will eventually be transformed into a motive for

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compromise. Therefore, politics and the economy are equally important in the trade competition <sup>[2]</sup>.

Technology is an essential carrier in the politics of great powers, and the mastery of new technologies can affect the political dynamics of great powers for decades <sup>[3]</sup>. Unlike the potential motivation of trade competition, the emergence of a science and technology competition is biased towards the complex trade-off considerations of the central government rather than the promotion of vested interest groups. Similarly, in terms of sustainability, due to the high dependence of military strength and economic industries on advanced technology, powerful countries will continue striving for technological advantages and prevent their opponents from developing. At the same time, technological warfare is usually introduced to maintain national security. For example, civilian commercial technology may be applied to the military.

This paper is divided into four parts. The first part focuses on the inevitable point of view of the Sino-US science and technology competition from two perspectives of the economy and national nature. The second part discusses the means of the United States in this technological competition. The third and fourth part analyzes the influence of the science and technology competition on the world and how China should deal with it.

## **2 Why the Science and Technology Competition between China and the United States cannot be Avoided?**

From the perspective of economic relations, after the end of the Cold Competition, China's cheap labor force prompted Western countries led by the United States to continuously shift the low-end industries in the global industrial chain to China. Although Western countries have implemented strict technology export controls on China, they still subjectively hope that China can develop in the direction they want. In the context of the global industrial chain, China will always provide a large amount of cheap labor and actively undertake the transferred primary and secondary industries.

However, through the "wild goose array model", that is, the organic combination of import substitution and export-oriented strategies. Its most significant feature is to improve the country's technical level by importing technology and equipment to enhance the production capacity. The Chinese government has used the comparative advantages of developing countries and economies of scale. Since China's reform and opening up, China's economic and technological prowess has grown. Especially in the global financial crisis in 2008, China's economic and technological strength has been steadily rising <sup>[4]</sup>. On the one hand, the Sino-US trade balance has continuously widened. On the other hand, under the background of the vigorous development of high-tech industries led by communication technology, the high-value-added technology industry in the United States has been constantly challenged by Eastern countries.

These are serious threats to American hegemonism, but based on the existing high economic interdependence between China and the United States, both sides are vulnerable to the influence of each other's strategic manipulation, so the science and technology competition between the two cannot be avoided. However, it is destined to be

diversified and maintain a long-term nature.

For deeper reasons, the nature of the countries of China and the United States dictates that creating technological competition is inevitable. In world history, cohesion, or population unity, has often been an essential feature of a strong nation, but the United States does not need this to remain strong. Since the twentieth century, the United States has evolved into a capital agglomeration that maximizes the returns of transnational capital while blurring the concept of nationhood in a broad sense, that is, how to create the best environment that can attract transnational capital, which determines the direction of the American superstructure, not its ideology. For the United States, a country that befriends its subjects based on profit rather than its national, cultural, and historical identity, transnational capital is the key to maintaining a national centripetal force.

In contrast, China is a country coalescing based on cultural communities, a high degree of centralization has led to the consolidation of a domestic market, attracting a large amount of transnational capital with astonishing social and economic achievement. This is why parts of the West, led by the US, are ambivalent towards China, such as north-western Australia. The West is also interested in dealing with Russia and has chosen to surround and suppress it. In the eyes of the West, Russia threatens them in terms of strategic energy, military security, and ideology. This means that conflicts between the US and China are challenging to reconcile, and competitions in trade and technology are inevitable.

### **3 US Tactics in the Competition on Science and Technology**

It is worth researching the development of the US-China technology competition from the trade competition. During the presidency of Barack Obama return to the Asia-Pacific strategy was proposed. Since the Trump administration, relations between the two countries have deteriorated sharply. The US has maintained a zero-sum mindset, convinced that China's technological advances have widened the US-China trade gap and blamed it all for US citizens' unemployment and declining incomes. In December 2017, the Trump administration claimed it would impose trade sanctions against China, take related legislative measures, and release its first National Security Strategy Report. On August 14, 2017, President Trump directed the Office of the US Trade Representative to investigate China's unreasonable and unwarranted legal policies and practices that undermine US advantage, innovation, intellectual property, and technology development. He claimed that China's policies and actions could negatively impact US economic interests, particularly affecting the United States' position as a world leader in R&D-intensive high-tech products. On March 22, 2018, based on the results of the 301 investigations, then-President Trump signed a presidential memorandum stating "US intellectual property and trade secrets are being steadily stolen by China" and imposing massive tariffs on imports from China, discouraging Chinese companies from investing and producing in the US, and forcing China to change this unfair trade <sup>[5]</sup>. Thus began the trade competition between the US and China, gradually moving towards a technology competition.

It was not until 2018 that the US government enacted the Export Control Reform Act (ECRA) to strengthen export controls on Chinese technology products. In November 2018, the BIS identified emerging technologies critical to US national security and listed 14 "representative technology categories" to target China's high technology industry plans explicitly and to include. In May 2019, the BIS issued a final rule amending the EAR to add Huawei and 68 non-US companies to the physical control list, cutting off trade opportunities between these companies and suppliers of critical components to the US <sup>[6]</sup>. Thus far, the technological competition between the US and China has continued.

During the Trump administration, to win the next election, Trump wanted to restrict trade between China and the US, develop related industries, and thus create more jobs, thus winning the support of lower and middle-class voters <sup>[7]</sup>. This is why slogans such as "America First" and "Great Again" are being raised, and advanced technology is being used as leverage to force China to modify or abandon its centrally-led policies in high-tech industries and technology transfer by strengthening trade sanctions, investment controls, and restrictions on science and technology exchanges in various areas. The intention is to force China to remain trapped in the lower reaches of the global industrial chain.

The Trump administration has not achieved its strategic objectives, as Beijing has maintained an uncompromising attitude. After President Biden took office, the US administration continued its Trump-era policies. The difference is that Biden has tried to bind his Western allies with ideological depth, thus imposing a global technological siege on Beijing. In the semiconductor sector, for example, Beijing has developed a "National IC" plan for semiconductors to reduce dependence on US and other foreign semiconductor technologies and advance China's innovation. The US government subsequently introduced ECRA and ordered the Department of Commerce's Bureau of Industry and Security (BIS) to review the addition of new 'emerging' and 'foundational' technologies to the US Department of Commerce's Controlled Commodity List (CCL), which would require export licenses for the sale and transfer of Export licenses for such technologies and compel its allies to also apply the new ECRA technology controls under the multilateral framework of the Wassenaar Arrangement, which includes 41 other member states <sup>[8]</sup>. Also, in the chip industry. Led by Biden Administration, the United States organized the Chip Alliance between the United States, Japan, and Taiwan (Chip 4), which aims to impose a complete blockade on China's chip manufacturing industry by cutting off the supply of 14-17 nm chip design and manufacturing equipment, software and finished products from China by high-end chip companies in the alliance <sup>[9]</sup>.

It is necessary to consider the motives of the US government. The Trump administration implemented policies to limit bilateral trade between China and the US, develop related industries, and thus create more jobs, thus winning the support of lower and middle-class voters and aiming at the next election. This is why the slogans "America First" and "Great Again" were raised. Then President Biden continued the same principle.

## 4 The Global Impact of the China-US Science and Technology Competition

Beijing and Washington have inevitably fallen into the Thucydides trap, according to which the transition of power in the US and China is bound to lead to more competition for control. Western politicians firmly believe that the competition of science and technology is the United States' suppression of China's development model and the struggle between the Beijing model and the Washington model, both of which are fighting for dominance in world politics and economics and for the right to set the rules of the game of economic globalization.

Regarding the global economy, the US-China technology competition has directly affected international trade flows and global supply chains. This makes not only relevant high-tech companies worldwide caught in the whirlpool of the US-China science and technology competition but also causes extensive collateral damage, mainly affecting primary, secondary, and tertiary suppliers and service providers in related industries [10]. Moreover, as high-end technology is increasingly embedded in complex global supply chains, often the value of the final product is contributed by multiple countries. When China and the United States try to exclude each other from the physical manufacturing of goods and services using sensitive technologies [11], the result will be parallel trade and investment networks that shatter global value chains.

Regarding the global political situation, the Sino-US technological competition has led to a political landscape increasingly influenced by technological nationalism. A Sino-American technological competition could lead to the Galapagos syndrome, an emerging state-centric model that not only sees two big countries competing to bring smaller economies into their systems but a "you're with me or you're against me" strategic mentality that could lead to direct political or economic pressure on other small countries. Force countries to take sides in business, science, and defense [12].

## 5 How Should China Respond?

China should recognize the reality and respond positively. Including Chinese companies on the US Commerce Department's restricted list marks a watershed in bilateral relations and the start of an increasingly fragmented and uncertain landscape. Because of the pervasive influence of techno-nationalist policies and the unique link between high technology and national security, the decoupling of certain Sino-US value chains will be irreversible [13].

Given its heavy reliance on American technology, China must redouble its efforts to de-Americanize and take full advantage of domestic and international technology innovation. Besides, China should consider the US a hub for multinational capital, integrate its domestic market with the central government, and differentiate and counter it by attracting American global capital. Moreover, to maintain the international political and economic order, China should strengthen its corporation with Asia, Europe, and Africa. Finally, China and the US should effectively resolve disputes and manage conflicts on bilateral science and technology issues. The two critical countries should

uphold the principle of equality and mutual benefit and work to maintain the global political and economic order.

## 6 Conclusion

Against China's growing prosperity, Beijing and Washington are competing for power in many areas. As an indispensable part of the politics and national security of the great power, the US has begun the competition on high technology and has imposed a series of policies targeting China. Due to the fundamental differences in national nature and values between China and the United States, after the trade competition launched by the Trump administration, the struggle between the two powers has gradually shifted from a trade competition to a competition of science and technology, which has segmented global trade and broken global value chains, and also caused the expansion of technological nationalism. In the face of the attempts of the two US administrations to force China to revise or abandon its state-led high-tech industrial policies and technology transfer policies, China should actively respond and counter, and at the same time, act as a significant country and strive to maintain the international political and economic order.

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