

Analysis of the economic impact of decoupling between China and the United States

The Economist magazine noted in 2021 that "sanctions are now a central tool of the U.S. government's foreign policy." It is true that the U.S. intentions to try to contain China's development through sanctions are becoming increasingly clear, and its recent sanctions against China have focused more on benchmark strikes, seeking to maximize strikes against China under conditions that minimize adverse effects on the United States. At the same time, the numerous unprecedented sanctions against Russia since the Ukraine crisis, using the U.S. military and financial hegemony, also give us a glimpse of the possibility of "extreme sanctions" against China in the future. This study will use the World Bank's open global computable general equilibrium (ENVISAGE) to examine the impact on China of future sanctions, even extreme sanctions, that the United States may be able to impose on China.

I. the United States has regarded China as the "biggest geopolitical challenge", sanctions against China will continue unabated

The U.S. national strategy toward China has shifted from a "focus on cooperation" to a "focus on competition or even confrontation. For a long time, the U.S. has tried to eliminate ideological antagonism between the U.S. and China by promoting China's integration into the global economic and trade system and deepening political and economic cooperation between the two sides. For example, Obama's National Security Strategy in both of his terms emphasized the need to strengthen a positive and comprehensive cooperative relationship with China, and in his second term, despite reservations, still considered the scope of cooperation with China to be unprecedented. However, the Trump tenure has seen a fundamental change in U.S.-China relations, and its National Security Strategy emphasizes values and interests between China and the

United States that are contrary to each other. After Biden took office, not only did he not change the direction of the previous administration's strategy toward China, but he even further clarified the confrontation between the U.S. and China. In October 2022, the just-released U.S. government National Security Strategy even explicitly stated that "China is the only competitor that has both the intent to reshape the international order and growing economic, diplomatic, military, and technological power", while defining China as the "greatest geopolitical challenge" facing the United States. This series of shifts means that for U.S. policymakers, China has completely changed from a "collaborator" to a "threat", and U.S. containment of China will be on an escalating trend.



Figure 1 Description of U.S.-China Relations in the U.S. Government's National Security Strategy

In the short term, the U.S. has been increasing its technology blockade against China, and unilateral "decoupling" of core technologies will become possible. From the geopolitical struggle between the U.S. and the Soviet Union around science and engineering during the Cold War, to the competition between the U.S. and Japan around semiconductors and other modern technologies in the 1980s and 1990s, to the current game between the U.S. and China around 5G and chips, it can be seen that the rise of other powers has triggered the rise of U.S. technological nationalism every time. The U.S. is trying to control the global advanced core technology in the hands of its own enterprises through various means to maintain its global technological hegemony. In 2022, the Biden administration reformulated the Critical and Emerging Technologies

List, which explicitly lists 19 categories and 104 subcategories of technologies that are "potentially critical to U.S. national security. The Biden Administration recreated the Critical and Emerging Technologies List, which identifies 104 subcategories of technologies in 19 categories that are "potentially critical to U.S. national security" and recommends that agencies refer to this list when designing "measures to address U.S. security threats" and "research and development technology initiatives.

On the one hand, the U.S. government has been increasing restrictions on the export of core technology-related products to China. In 2018, the U.S. Congress passed the Export Control Reform Act to restrict the export of advanced technologies to China, explicitly requiring the identification and control of "emerging and foundational" technologies that are "critical to U.S. national security. The Export Control Reform Act (ECRA) was passed by the U.S. Congress in 2008 to restrict the export of advanced technologies to China. In recent years, the U.S. Department of Commerce has rapidly increased the number of companies and entities from China on the Export Sanctions Entity List¹ under the Export Administration Regulations. At the beginning of 2017, there were only 295 entities from China (including Hong Kong, China) on the Entity List, but as of October 4, 2022, there were 1,005, a 2.5-fold increase compared to a 70 percent increase in entities from other countries during the same period. In addition, these Chinese entities included in the list of entities are basically related to advanced technologies, mostly electronic information companies (e.g. Huawei, Shangtang Technology, Kuangwei, KDDI, SMIC, Hesi, Feiteng, Hikvision, Dahua, DJI, etc.). In addition, from the initial cut-off of chip supply to individual Chinese companies (SMIC, Huawei) to the introduction of the Chip and Science Act in 2022, it can also be seen that the scope of U.S. sanctions against China's advanced technologies is indeed expanding rapidly.

On the other hand, the U.S. is also accelerating the reduction of its dependence on Chinese core technology (manufacturing). The U.S. has not been able to remove the

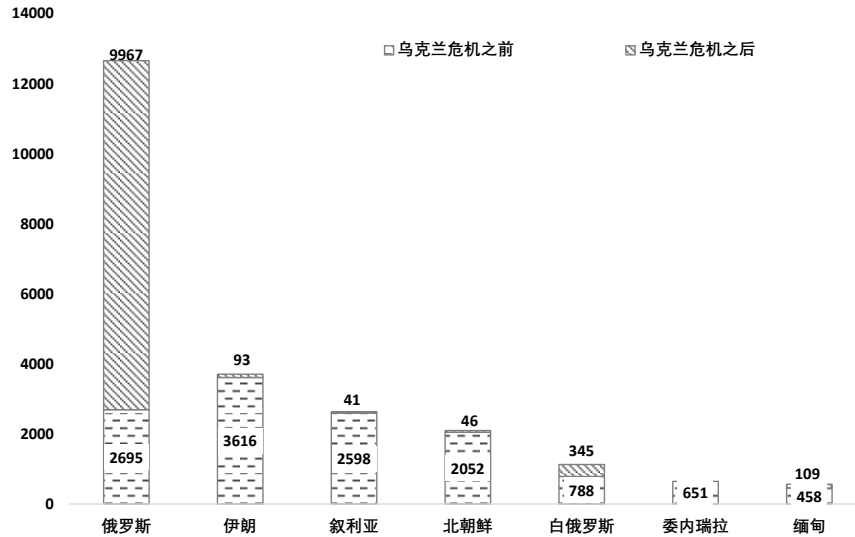
¹ This is an end-user based control measure for foreign companies and other entities involved in "activities contrary to the national security or foreign policy interests of the United States"

tariffs imposed on most imports from China in 2018. At the same time, the U.S. has restricted the purchase of Chinese high-tech products and technical services by U.S. companies and institutions through telecommunications licensing and equipment authorization, technology transaction reviews, federal government procurement restrictions, and federal investigations and prosecutions on national security grounds. For example, in March 2021, the U.S. Department of Commerce (DOC) issued an updated rule on Securing the Information and Communications Technology and Services Supply Chain (ICTS Supply Chain Security Rule), which allows the DOC to review and ban nearly all China-originated artificial intelligence and machine learning, quantum key distribution, quantum computing, drones, robotics, and other technologies widely used in the United States; the Federal Communications Commission (The FCC's list of companies that pose an "unacceptable risk to the national security of the United States or the safety and security of U.S. persons" under the Secure and Trusted Communications Network Act continues to expand, and as of October 2022, the list has expanded to 10 companies, all but one of which are Chinese companies. In addition, the U.S. government has not only restricted its own direct purchases or use of Chinese products and technologies, but has also blacklisted some Chinese equipment from the federal government under the National Defense Authorization Act, prohibiting contracts with federal contractors and grantees that "use" such equipment, respectively.

In addition to these domestic restrictions on China's core technologies, the U.S. is also trying to bring in and coerce other countries and regions to close the loop on advanced technologies through direct alliances or "long-arm jurisdiction or secondary sanctions" and "interest inducement. China will be excluded from the global core technology innovation chain and industrial chain. For example, on June 2020, the U.S. planned the "Clean Network" program for China's 5G technology, forcing other countries to abandon the purchase of Huawei and ZTE's 5G equipment; in March 2022, it proposed the "Chip Quad Alliance" concept, which seeks to establish a chip alliance consisting of the world's four most important countries and regions in the field of chip manufacturing (the United States, Japan, Chinese Taiwan

and South Korea), as well as the introduction of the Chip and Science Act, are attempts to jointly sanction the development of China's chip industry.

In addition, the comprehensive sanctions imposed on Russia by the U.S. and Western countries in the wake of the Ukraine crisis show us a possible scenario of extreme U.S. sanctions against China. Since the outbreak of the crisis in Ukraine in February this year, the U.S. and its allies have been increasing the intensity and breadth of sanctions against Russia. In contrast, on the one hand, the intensity of sanctions is unprecedented. According to statistics, as of October 12, 2022, the number of sanctions taken by the U.S. and the West as a result of the Ukraine crisis amounted to 9,967, which is 3.7 times more than before the crisis and close to the sum of the number of sanctions imposed by the U.S. and the West on Iran, Syria, North Korea, Belarus, Venezuela, Myanmar and other major U.S. sanctions targets before the crisis. On the other hand, the measures of sanctions are unprecedented. The U.S. used its financial hegemony to "weaponize" financial instruments and, in particular, to break the usual rules of international finance by freezing the foreign exchange reserves of the Russian Central Bank. In addition, it is trying to strike precisely at energy exports, the biggest dependence of the Russian economy, through joint price restrictions. With the evolution of the century-long changes, especially if the situation in the Chinese Taiwan Strait develops in the direction of deterioration, it is entirely possible that a fierce confrontation between China and the United States or even a large-scale war will occur, when the United States may invoke the Trading with the Enemy Act and other extreme sanctions against China similar to those imposed on Russia.



Data source: <https://www.castellum.ai/russia-sanctions-dashboard>

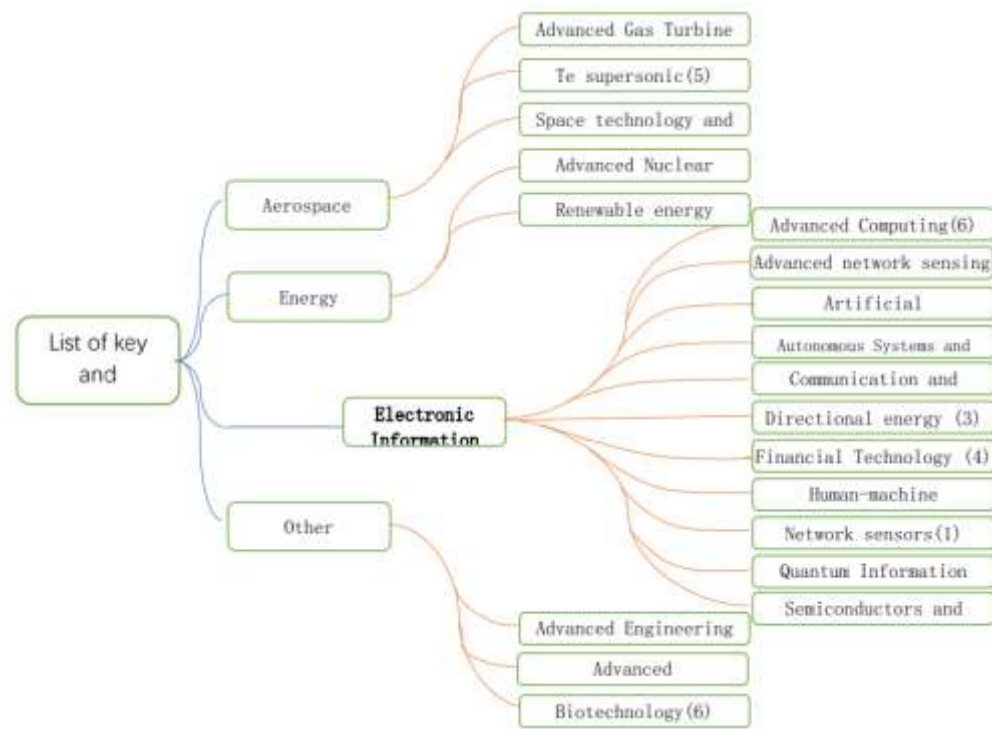
Figure 2 Number of U.S. sanctions against selected countries (items)

II. Scenario design of future U.S. sanctions against China

Based on the previous analysis of U.S.-China relations and U.S. sanctions against China, we design two main scenarios of U.S. sanctions against China, namely "possible scenarios" and "extreme scenarios".

The main consideration of the "possible scenario" is that U.S. sanctions against China continue the recent trend of "decoupling" from China in the area of "critical and emerging technologies," i.e., curbing China's technological progress in these areas and reducing its dependence on China in these areas. In other words, it will curb China's technological progress in these fields and reduce its dependence on China in these fields, and at the same time force some countries and regions to exclude China from the critical and emerging technology innovation chain and industrial chain by means of direct alliances and "long-arm jurisdiction" and "secondary sanctions. It is important to note that while critical and emerging technologies cover a wide range of areas, this study focuses on the "communications equipment, computers and other electronic devices" sector. This is based on two considerations: First, from the list of "critical and emerging technologies" developed by the U.S. government, most of the technologies can be

attributed to this industry, with 65 of the 104 refined technology categories belonging to the electronic information and communication category (see Figure 3). Moreover, the recent sanctions imposed by the U.S. on China have basically targeted this industry. Second, this industry is also China's largest export sector and the sector with the greatest technological dependence on the U.S.



Source: Compiled from the most recent list available on the U.S. White House Web site (<https://www.whitehouse.gov>); numbers in parentheses include the number of technology categories broken down

Figure 3 List of Critical and Emerging Technologies in the United States

The "possible scenarios" specify the following sanctions: (1) a ban on exports of "communications equipment, computers, and other electronic equipment" to China; (2) a ban on imports of "communications equipment, computers, and other electronic equipment"; (3) restricting capital flows in this area; (4) prohibiting the exchange and cooperation of U.S. and Chinese personnel in this area; and (5) promoting the unilateral "decoupling" of other countries and regions (Chinese Taiwan, South Korea, and Japan) from China in this area, as envisaged by the U.S. in the "Quadrilateral Alliance on Chips". (5) promote unilateral "decoupling" of other countries and regions in the U.S.

envisioned "chip quadruple alliance" (Chinese Taiwan, South Korea, and Japan) from China in this area, i.e., a ban on exports of communications equipment, computers, and other electronic devices to China. See Table 1 for a more detailed parameter setting of the scenario.

The "extreme scenario" mainly considers that the U.S. will adopt more comprehensive, more drastic and more extreme sanctions against China: on the one hand, it comprehensively covers the areas of sanctions in the "possible scenario", and on the other hand, it draws on the sanctions imposed by the U.S. on Russia after the Ukraine crisis. On the other hand, they are based on the sanctions imposed on Russia by the United States after the Ukraine crisis. Specifically, the following sanctions are set: (1) a total ban on exports to China; (2) a total ban on imports of products from China; (3) financial sanctions, including the inclusion of major Chinese banks on the SDN list (prohibiting U.S. financial institutions from providing financial services to major Chinese banks), the exclusion of major Chinese banks from the System for International Funds Settlement (SWIFT), and the freezing of assets and foreign exchange reserves; (4) encouraging and forcing the withdrawal of U.S. foreign companies established in China; (5) imposing a total ban on the exchange and cooperation of Chinese and U.S. talents; (6) restricting airspace; and (7) pushing its political allies (the "Five Eyes Alliance") to fully "decouple" from China. See Table 1 for more detailed parameterization of the scenarios.

In addition, the practice of U.S. and Western sanctions in the aftermath of the Ukraine crisis shows that the parties' interests are very different and they are willing to bear different costs for sanctions. At the same time, considering that China's economic ties with major Western countries are significantly stronger than Russia's, the cost of countermeasures from China may be higher for those countries that are less dependent on Russia for energy. As a result, there is a great deal of uncertainty about whether and to what extent the U.S. can join with other major countries (mainly the EU, Japan, South Korea, etc.) in imposing sanctions on China, in addition to its allies in the Five Eyes Alliance. To reflect this uncertainty, this study designed an "extreme+ scenario" based

on the "extreme scenario. This scenario includes all of the sanctions in the "extreme scenario" and also considers the EU, Japan, and South Korea joining the sanctions against China.

Table 1 Scenario setting of U.S. sanctions against China

	Sanctions Initiatives	Technical Settings
Possible scenarios	➤ A ban on the export of communications equipment, computers and other electronic equipment to China; ➤ Prohibit the import of Chinese-made communications equipment, computers and other electronic equipment; ➤ Restrictions on the movement of capital in this area; Prohibit the exchange and cooperation of Chinese and American talents in this field; ➤ Promote the unilateral "decoupling" of other countries and regions (Chinese Taiwan, Korea and Japan) from China in these areas in the U.S.-conceived "chip quadrilateral alliance".	➤ The imposition of a 75% export tax by the United States on electronic equipment exported to China; ➤ The imposition of a 75% import tariff by the United States on electronic equipment from China; ➤ Chinese Taiwan, South Korea, and Japan imposed a 75 percent export tax on electronic equipment exported to China; ➤ Productivity gains in China's electronics manufacturing industry are 2 percentage points lower.
Extreme scenarios	➤ A total ban on exports to China; ➤ A total ban on the import of products from China; ➤ Imposing financial sanctions, placing major Chinese banks on the SDN list (prohibiting U.S. financial institutions from providing financial services to major Chinese banks), excluding major Chinese banks from the System for the International Settlement of Funds (SWIFT), and freezing assets and foreign exchange reserves; ➤ Encouraging and coercing the withdrawal of foreign enterprises established in China by the United States; ➤ A comprehensive ban on U.S.-China talent exchange and cooperation; ➤ Restricted airspace; ➤ United with its political allies (the "Five Eyes Alliance") to fully "disassociate" with China, etc.	➤ A 75 percent export tax increase on all U.S. exports to China; ➤ The imposition of a 75% import tariff by the United States on all products from China; ➤ 10% increase in the cost of China's import and export trade to countries and regions other than the United States ➤ Some industries that are more dependent on U.S. capital have a 2 percentage point lower rate of productivity improvement. ➤ The other countries in the "Five Eyes Coalition" have imposed a 75 percent export tax and import tariff on all exports to China and imports from China, respectively.
Extreme+ scenarios	➤ Includes all sanctions in the "extreme scenario" ➤ The European Union, Japan and South Korea have fully "decoupled" from China, etc.	➤ Includes all sanction settings in "extreme scenarios" ➤ The European Union, Japan and South Korea imposed a 75% export tax and import tariff on all exports to and imports from China, respectively.

III. Analysis of the results of the impact of U.S. sanctions on China

Currently, there are already very strong economic linkages among the major global economies. To quantitatively analyze the economic impact of U.S. sanctions, the report utilizes the World Bank's open global computable general equilibrium model of the global economic general cycle (ENVISAGE). The report divides the world into 21 countries and regions (including China, the United States, Germany, France, the United Kingdom, Japan, Russia, India, South Korea, Canada, Australia, etc.) and divides the total production activities into 27 production sectors. On this basis, the model is used to simulate the previously set scenarios to reflect the possible economic impacts of different U.S. sanctions on China by comparing the differences of the main economic and social variables under the possible scenarios, extreme scenarios and no-sanctions scenarios. The specific impact results are as follows.

1. The possible scenario of U.S. sanctions against China would lead to a decrease in China's GDP growth rate by about 1.44 percentage points

The electronic communication equipment manufacturing industry is the most important export sector in China. 2021 exports of this industry accounted for nearly 40% of China's total merchandise exports. At the same time, the electronic communication equipment manufacturing industry is an important industry representing the development direction of the new round of technological revolution and industrial change, and the United States has a strong competitive advantage in this industry, so the United States initiated "decoupling" sanctions against China in the industry will certainly cause a greater impact on China's overall economy, especially the development of the electronic communication equipment manufacturing industry. The results of the simulation show that the U.S. would have a significant impact on the development of the Chinese economy in general and the electronic communications

equipment manufacturing industry in particular. Simulation results show that the possible scenario of U.S. sanctions would lead to a 1.44 percentage point reduction in China's economic growth rate.

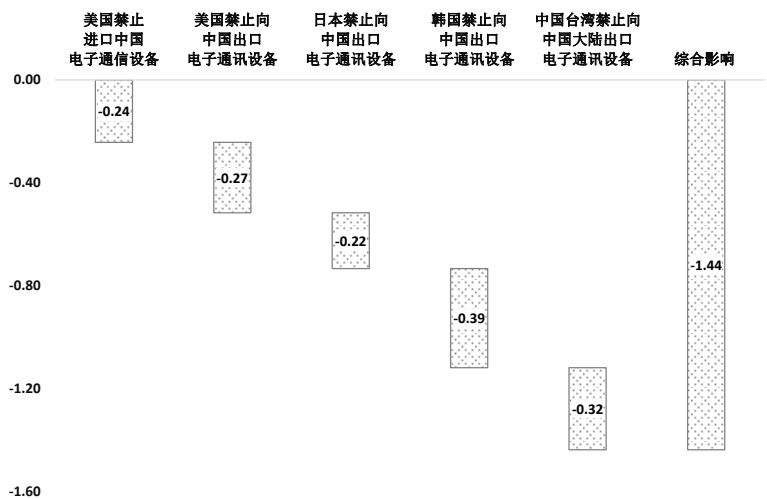


Figure 4 Impact of U.S. sanctions moves against China on China's economic growth rate (possible scenarios, percentage points)

However, the simulations also show that the impact of U.S. sanctions against China's electronic communications equipment manufacturing industry depends both on whether they are "decoupled" in both directions and on whether they can be combined with the members of its envisioned "chip alliance" to sanction China (see Figure 4).

If the U.S. is considered alone, the impact of its "decoupling" of China's electronic communications equipment manufacturing industry on China is relatively limited. Simulation results show that a separate U.S. "decoupling" would lead to a 0.52 percentage point decline in China's economic growth, which represents only 36 percent of the total impact of the possible scenario. The impact of a ban on imports of electronic communication equipment (products) from China is 0.24 percentage points, which is closely related to the fact that the U.S. is China's largest export market for electronic communication equipment, while the impact of a ban on exports of electronic communication equipment (products) to China is 0.27 percentage points, which is to some extent closely related to the larger impact of imports from the U.S. on the productivity of the industry.

The most important determinant of the impact of U.S. sanctions on China is whether the "chip alliance" envisioned by the United States jointly adopts an embargo on electronic communications equipment to China. Simulation results show that a ban on the export of electronic communications equipment to China by South Korea, Chinese Taiwan and Japan would result in a 0.92 percentage point decline in China's economic growth rate. Among them, South Korea would have the largest impact of 0.39 percentage points, followed by Chinese Taiwan at 0.32 percentage points, and Japan at 0.22 percentage points. This to some extent reflects the lack of strong manufacturing capacity in the U.S. electronic communications equipment manufacturing industry, which is precisely why the United States is eager to enhance the U.S. manufacturing capacity and international competitive advantage in this field through the "Chip Act. It should be noted that, although South Korea, Chinese Taiwan and Japan in the field of electronic communications equipment each have strong competitiveness, but in the context of the deep division of labor in the global industrial chain, the three places, especially South Korea and Chinese Taiwan in the field of the United States there is a strong dependence on the three places the industry's first intermediate input source countries are the United States. Measurement data show that South Korea and Chinese Taiwan 's exports of electronic communications equipment to China include the United States added value reached an average of 3.5% and 2.4%, respectively, much higher than other countries, some high up to products this proportion is higher. Therefore, the United States is likely to coerce South Korea and Chinese Taiwan and other places to prohibit the export of electronic communications equipment to China through the Export Administration Regulations and other requirements based on the origin of the United States.

It is also important to see that while these U.S. sanctions have a large impact on China, they also have a large impact on the U.S. and other participants. Among them, the U.S. itself is the most negatively affected, which in aggregate is equivalent to 0.89% of its GDP; followed by Japan and South Korea, which are equivalent to 0.39% and 0.24% of their GDP, respectively; and Chinese Taiwan, which is affected by a relatively

small amount, equivalent to only 0.12% of its GDP.

2. The extreme scenario of U.S. sanctions against China will lead to a decrease in China's GDP growth rate by about 5 percentage points

The results of the simulations show that the extreme scenario of U.S.-initiated sanctions against China leads to far greater adverse impacts than the possible scenario, and that their combined impact would reduce China's GDP growth by nearly 5 percentage points. Breaking down these specific sanctions initiatives reveals that two main sources of adverse impacts arise from the sanctions (see Figure 5).

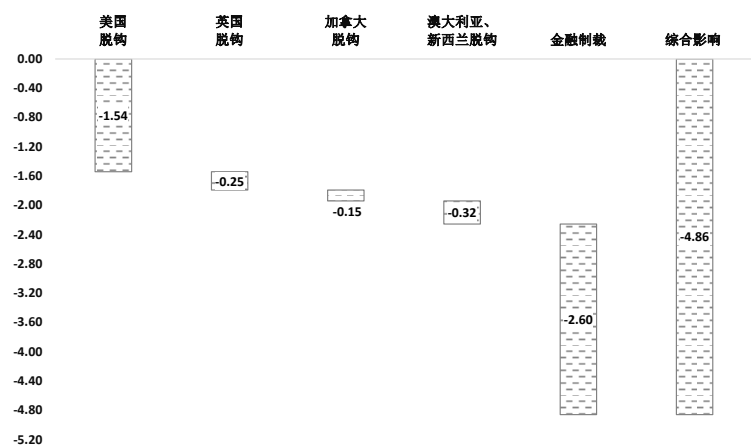


Figure 5 Impact of U.S. sanctions moves against China on China's economic growth rate (limiting scenario, percentage points)

The biggest impact in the extreme scenario comes from the financial sanctions initiated by the US. On the one hand, in the context of international settlements that rely mainly on the US dollar, freezing foreign exchange reserves would itself directly limit the ability to conduct foreign trade, while affecting the capital and foreign exchange markets with dramatic fluctuations that would also affect foreign trade and the domestic economy. On the other hand, the exclusion of Chinese banks from the SWIFT system would significantly enhance the cost of trade between China and third parties. The SWIFT system currently has over 11,000 participants, while China's own cross-border clearing system, CIPS, has just over 1,300 participants, mostly from Asia, and is far from being a direct substitute. While other alternatives exist, the overall trade costs are bound to be significantly higher. As a result of the simulation, under the

previous scenario assumptions, U.S.-initiated financial sanctions would cause China's exports to countries and regions other than the United States to fall by about 30 percent, causing China's GDP growth to fall by 2.6 percentage points, more than half of the total impact of the extreme scenario.

Another major impact of the extreme scenario comes from the full "decoupling" of the U.S. itself from China. According to data, the United States is China's top export market and fourth largest source of imports in 2021, accounting for 17.2 percent and 6.8 percent of China's total exports and imports, respectively. A full "decoupling" of the U.S. from China would not only significantly reduce international demand for Chinese products, but would also affect domestic economic cycles and economic linkages between China and other countries through production networks. The simulation results show that the U.S. own "decoupling" would lead to a 1.54 percentage point reduction in China's GDP growth, accounting for 1/3 of the total impact in the extreme scenario.

Overall, the impact of the "decoupling" of U.S. allies from China in the extreme scenario of the "Five Eyes Alliance" is relatively modest. The fundamental reason for this is that the share of these countries in China's foreign trade is relatively small: in 2021, the share of these four countries in China's total exports is only 6.4 percent, and the share of total imports is only 8.8 percent. Thus, the impact of "decoupling" these countries from China would be relatively small. The largest of these countries is Australia (including New Zealand), whose "decoupling" impact on China is equivalent to only 0.32% of China's GDP. The UK and Canada have a smaller impact, at 0.25 and 0.15 percentage points respectively. However, it is worth noting that Australia is the main source of some of China's mineral and energy imports, and Canada is the main source of some of China's grain and food imports, so the "decoupling" of these countries will pose a certain risk to the security of China's domestic supply of minerals, energy and food.

It is also important to emphasize that these U.S. allies will pay a heavy price for joining the U.S. in sanctions against China. Simulations show that the UK, Canada and Australia (including New Zealand) would see their own GDP fall by 0.75%, 1.16% and

0.73% respectively if they "decoupled" from China.

IV. Main Conclusions

As we can see from the previous analysis, even under the "possible scenario", the adverse impact of U.S. sanctions against China is huge. As seen in the previous analysis, the results of both the "possible scenarios" and the "extreme scenarios" simulations show that the lack of support from allies will greatly reduce the effectiveness of U.S. sanctions against China. The results of the "extreme sanctions" simulation show that financial sanctions are the largest source of adverse effects of U.S. sanctions against China.