

2025 Asia and Pacific Mathematical Contest in Modeling

Problem C

Impact of U.S. Tariff Policies on Global Trade and Regional Economies

On April 2, 2025, the Trump administration introduced the so-called "Reciprocal Tariffs" policy, establishing a 10% "minimum baseline tariff" on all trading partners and imposing additional higher tariffs on approximately 60 countries and regions with which the U.S. ran trade deficits, including China. The U.S. claimed that varying tariff rates and non-tariff barriers among trading partners made it harder for American manufacturers to sell products abroad, leading to persistent U.S. trade deficits and manufacturing decline. Thus, it imposed "reciprocal tariffs" on all countries to reduce its trade deficit and promote manufacturing reshoring [1]. However, this policy is inconsistent with the fundamental principle of "Most-Favored-Nation (MFN) Treatment" of the World Trade Organization (WTO) and also challenges the WTO's tariff preference principle for developing countries. Under WTO rules, members must apply uniform tariffs to all partners, but the Trump administration exercised unilateral pressure and bilateral negotiations to implement widely varying tariff standards across economies, with agreed rates far exceeding previous levels. According to a tariff tracking tool jointly developed by the WTO and International Monetary Fund (IMF), the U.S. trade-weighted average tariff rate on all products rose sharply from 2.44% at the start of 2025 to 20.11% by August 2025 [2]. A Yale Budget Lab report noted that this tariff increase pushed the U.S. overall average effective tariff rate to its highest level since 1933 [3].

Beyond serving as a source of fiscal revenue, tariffs are an important tool of national trade policy. Appropriate tariffs can protect domestic industries from global economic monopoly and coercive practices, and are therefore permitted by the WTO.

However, the impact of tariffs is multifaceted. Excessively high tariffs hinder the development of global trade and are detrimental to long-term world economic growth. In the short term, high U.S. tariffs may bring benefits such as increased tariff revenue and a reduced trade deficit, but they also lead to declining exports and higher domestic consumer prices. For example, according to statistics from General Administration of Customs of the People's Republic of China (GACC) [4], in the month the "reciprocal tariffs" took effect, U.S. imports from China fell 20% year-on-year, while U.S. exports to China dropped 13% due to Chinese countermeasures. By May 2025, imports from China had fallen 35% compared with May 2024, and exports to China declined 18%. In absolute terms, the U.S. trade deficit with China narrowed from \$30.8 billion in May 2024 to \$18.0 billion in May 2025, but U.S. exports to China also fell from \$13.2 billion to \$10.4 billion, negatively impacting related U.S. industries. Overall, the adverse effects of high tariffs on U.S. trade and the economy cannot be overlooked.

Your team is tasked with analyzing the impact of U.S. tariff policy adjustments on international trade and regional economies, based on U.S. tariff and global trade data. Address the following questions:

Question 1: The United States, Brazil, and Argentina are the world's largest soybean producers and exporters, while China is the largest soybean importer. Analyze the current state of soybean trade between China and these countries. Develop a model to assess the impact of U.S. tariff adjustments on the soybean industries of the U.S., Brazil, and Argentina. Estimate the post-adjustment distribution of soybean export volumes and values for these three countries.

Question 2: The United States is the world's second-largest automobile market and the largest automobile importer. In 2024, 46% of cars sold in the U.S. were imported [5], with Japan as a major source. Besides direct exports from Japan, Japanese automakers also invest in U.S. production or manufacture in countries like Mexico for export to the U.S. Analyze the current position of Japanese automobiles in the U.S. market. Develop a model that incorporates Japan's non-tariff response

strategies and economic transmission effects to examine the impact of U.S. tariff adjustments on U.S.-Japan automobile trade, the structure of U.S. auto imports, and the U.S. automobile industry.

Question 3: The United States dominates the global semiconductor (chip) industry but lacks strong manufacturing capacity. The Biden administration passed the CHIPS and Science Act in August 2022, using subsidies to boost advanced semiconductor manufacturing. However, the Trump administration in 2025 argued that tariffs are more effective than subsidies. Concurrently, the U.S. imposed export controls on high-end chips to China, citing national security and technological leadership concerns. Develop a model analyzing the effects of U.S. tariff policies on domestic semiconductor manufacturing and trade in high-, mid-, and low-end chips, considering both economic efficiency and national security.

Question 4: Raising tariff rates may increase government tariff revenue in the short term but reduce trade volumes, potentially lowering revenue over time. Develop a model to analyze the short- and medium-term impact of U.S. tariff adjustments on U.S. tariff revenue. Predict the net change resulting from these adjustments in U.S. tariff revenue during the second term of the Trump administration.

Question 5: U.S. tariff hikes may trigger countermeasures from trading partners. For instance, China imposed reciprocal tariff countermeasures and implemented targeted export controls on rare earths, lithium batteries, etc. [9]. These countermeasures will undoubtedly bring complex impacts on U.S. foreign trade, thereby exerting comprehensive and profound effects on agriculture, industry, and other sectors within the United States, and may also affect financial markets such as the U.S. dollar, U.S. Treasury bonds, and virtual currencies. Select or construct economic indicators to model the short- and medium-term impact of U.S. tariff adjustments on the U.S. economy. Use the model to evaluate whether the "reciprocal tariffs" policy can genuinely drive manufacturing reshoring.

Glossary:

- **Reciprocal Tariffs:** Originally refers to a system where two or more countries mutually reduce or eliminate import tariffs through bilateral or multilateral negotiations. Here, it specifically denotes the tariff policy announced by the Trump administration on April 2, 2025. While nominally implying equal tariff rates between the U.S. and its partners, the U.S. imposed a 10% "minimum baseline tariff" on all partners and additional tariffs ranging from 11% to 50% on approximately 60 trading partners.

- **Most-Favored-Nation (MFN) Treatment:** Refers to the tariff and non-tariff preferential treatments mutually granted by WTO members that are no less favorable than those granted to any third country. According to Article I of the General Agreement on Tariffs and Trade (GATT 1994), any preference granted by a member to another member must be immediately and unconditionally extended to all other members.

Data Notes:

The attached data provides U.S. foreign trade data from 2020 onward, sourced from U.S. Trade & Tariff Data [6]. Teams are not limited to this data and may obtain additional trade data from official sources such as [4] or non-tariff policy information from sources like [9]. Reasonable simulated data is also permitted.

References:

[1] The White House, Regulating Imports with a Reciprocal Tariff to Rectify Trade Practices that Contribute to Large and Persistent Annual United States Goods Trade Deficits.

<https://www.whitehouse.gov/presidential-actions/2025/04/regulating-imports-with-a-reciprocal-tariff-to-rectify-trade-practices-that-contribute-to-large-and-persistent-annual-united-states-goods-trade-deficits/>

[2] China Financial Information Network, [Global Finance] U.S. Average Tariff Rate Surges Significantly.

https://www.cnfin.com/hg-lb/detail/20250809/4283370_1.html

[3] Yale Budget Lab, State of U.S. Tariffs: August 7, 2025.

<https://budgetlab.yale.edu/research/state-us-tariffs-august-7-2025>

[4] General Administration of Customs of the People's Republic of China, Customs Statistics.

<http://www.customs.gov.cn/customs/302249/zfxxgk/2799825/302274/index.html>

[5] China Automotive News, U.S. Establishes New Tariff Barriers: Impact on Imported Cars?

http://www.cnautonews.com/yaowen/2025/02/28/detail_20250228372164.html

[6] Data Web: U.S. Trade & Tariff Data.

<https://dataweb.usitc.gov/>

[7] Stephen Miran. A User's Guide to Restructuring the Global Trading System. Hudson Bay Capital.

https://www.hudsonbaycapital.com/documents/FG/hudsonbay/research/638199_A_Users_Guide_to_Restructuring_the_Global_Trading_System.pdf

[8] Digital Economy Laboratory, University of International Business and Economics, Monthly Monitoring Report on China-U.S. Goods Trade (Jan-Aug 2025).

<https://delab.uibe.edu.cn/kydt/cgzs/2025n/2025n8yjcbg/d9650830544c49e2812662f722b08325.htm>

[9] Ministry of Commerce of the People's Republic of China, Announcements & Orders.

<https://www.mofcom.gov.cn/zcfb/blgg/index.html>