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# 2025 Taiwanese Economics Olympiad

Preliminary – Round 2: Application of Economics and Finance

## Question Booklet

**Time** Saturday, December 21, 2024, 13:00 to 16:00 (180 minutes)

**Locations** Taipei Gongtong Lecture Building,  
National Taiwan University  
Taichung Mingdao High School  
Kaohsiung TCCC Kaohsiung Xinyi

### Instructions

- Fill in your contestant number in the boxes at the top.
- Use only a blue or black pen or pencil.
- **Choose at least one problem from each section. Solve no more than 4 problems out of 6.**
- Do all rough work in the question booklet.

### Information

- This is an individual-based round.
- If you provide solutions for 5 or 6 problems, all of them will be graded, but only 4 will add to your result. If you do not specify which to grade, only the lowest 4 grades will be included in the result.
- If not stated otherwise, consider all goods, services, and assets infinitely divisible.
- Numbers of firms and people may be only integers.
- Convey your ideas clearly. Do not skip important logical transitions in your reasoning.
- Take care of handwriting. If you strike something out, it will not be graded.
- You may leave the examination venue more than 60 minutes after this round begins.

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## SECTION 1

### Problem 1 Remote area medical program in Taiwan

Rural areas in Taiwan have long faced a shortage of doctors. In mountainous regions, each doctor serves an average of 1,500 residents, and the retention rate of public-funded doctors is only about 16%. Moreover, 55 townships in Taiwan lack practicing dentists. To address the medical challenges in rural areas, the Ministry of Health and Welfare introduced the Remote Area Medical Program, but it has been criticized as creating a backdoor for so-called “*Bobo* doctors (波波醫生, a nickname for those with Polish medical degrees).”

The controversy surrounding *Bobo* doctors stems from 2008–2010, when some students pursued medical-related studies in some European countries like Poland, Spain, the Czech Republic, and Hungary. These students returned to Taiwan after graduation without completing internships or obtaining local medical licenses and took the national medical licensing exam to become certified doctors. Due to differences in their training compared to domestically trained doctors, public concerns arose.

Currently, the annual enrollment cap for medical schools in Taiwan is set at 1,300 students. The government uses quotas for enrollment and training to regulate the total number of doctors. Statistics show that Taiwan now has nearly 53,000 doctors, with the total increasing steadily by 1,400 to 1,600 annually. Some argue that as Taiwan’s population enters negative growth, there is no need to admit *Bobo* doctors. Others believe that asymmetric information in the medical industry necessitates strict regulation of the total number of doctors to prevent market failure.

### Questions

- (a) (10 points) At the end of the passage, it is stated that failure to control the total number of doctors would result in market failure. Use a supply–demand diagram to explain this phenomenon.
- (b) (10 points) Design an indicator to evaluate the extent of unequal distribution of medical resources in Taiwan.
- (c) (10 points) Reducing doctor qualification requirements and extending the rural service years for public-funded medical students are both proposed solutions to the rural medical dilemma. Do you think these policies can achieve the intended goal? Why or why not?



## Problem 2 Agrivoltaics (農電共生)

In February this year, TSMC (台積電)'s factory in Kumamoto (熊本), Japan, was officially inaugurated. TSMC's latest wafer fabs (晶圓廠) in Japan, the United States, and Germany will all use 100% renewable energy—green power—in the future. In Kumamoto, a major agricultural prefecture (縣) in Japan, the government has been constructing numerous solar power plants in the surrounding area and developing agrivoltaics to ensure a stable supply of green energy. This not only attracted TSMC to establish operations there but also holds the potential to transform Kumamoto into a semiconductor city.

Agrivoltaics involves installing solar panels on farmland or greenhouse rooftops, where the space below the panels is used for agricultural or livestock purposes. This setup can provide electricity to local communities while also generating crops that bring economic benefits to farmers. Currently, agrivoltaics is a global trend in green energy development, and Taiwan is actively promoting it. However, public opinion on agrivoltaics remains divided. Some believe it effectively improves land-use efficiency, while others criticize it, saying it could ultimately lead to “pretending to farm but actually producing electricity.”

### Questions

- (a) (10 points) Why does the phenomenon of “pretending to farm but actually producing electricity” arise? How can the government prevent this?
- (b) (10 points) Provide one example each for the external benefits and external costs of agrivoltaics.
- (c) (10 points) According to data from Taiwan Power Company, the cost of solar power generation is about 1.5 times that of coal-fired power generation. Why does TSMC still choose the more expensive green energy?

## SECTION 2

### Problem 3 Loss and Damage Fund

After years of disagreement between developed and developing countries, the Loss and Damage Fund was established during COP27 (第 27 屆聯合國氣候變遷大會) in Egypt. The fund aims to provide financial assistance to poorer nations affected by climate-related disasters—such as communities displaced by floods or rising sea levels—so they can rebuild and recover. Fifteen developed countries and a developing nation (the COP28 host UAE) have so far pledged around \$660 million.

China surpassed the US as the largest carbon dioxide (CO<sub>2</sub>) emitter in 2006 and, along with India—the third-largest emitter—continues to increase its emissions. The US, a developed country and the second-largest greenhouse gas emitter, and other developed nations argue that China and India should not only commit to significant emissions reductions but also contribute to the fund. However, China and India disagree, asserting that their high levels of emissions are a recent phenomenon compared to the historical emissions of developed countries like the US and the UK. They further argue that they are still considered developing countries under the 1992 UN Framework Convention on Climate Change and are therefore eligible to receive, rather than contribute to, the Loss and Damage Fund.

Developed countries counter that the current classification of countries is outdated and needs revision. Countries were designated as developed or developing in 1992, but critics point out that much has changed since then—particularly with China and India now being major economies and among the top greenhouse gas emitters. With the UAE—a developing country—pledging \$100 million to the fund, they argue that a precedent has been set.

#### Questions

- (a) (10 points) Use game theory to explain why, without subsidies, developed and developing countries find it difficult to reach a consensus on reducing carbon emissions.
- (b) (10 points) What potential issues might arise from the establishment of the Loss and Damage Fund?
- (c) (10 points) Propose two adjustments for the Loss and Damage Fund and explain their feasibility.

## Problem 4 *Swiftonomics*

Pop superstar Taylor Swift recently concluded her nearly two-year-long *The Eras Tour*, which spanned five continents. With 152 shows generating \$2.2 billion in revenue, it became the most profitable concert tour in history. In Asia, the tour was held exclusively in Tokyo and Singapore. The Singapore government allocated \$18 million to subsidize Taylor Swift's team, securing the exclusive performance rights for Southeast Asia. The six concerts in Singapore, with a total of 300,000 tickets, attracted a frenzy of 22 million fans vying for tickets, sparking a Taylor Swift mania (狂熱).

In addition to live concerts, Taylor Swift is also immensely popular on music streaming platforms, repeatedly named Artist of the Year on Apple Music, Spotify, and others. Her newly released album, *The Tortured Poets Department*, garnered over 300 million streams on its release day alone. However, her collaboration with streaming platforms has not always been smooth. Back in 2014, she pulled her entire catalog from Spotify, criticizing the platform for not providing adequate compensation to artists and producers. She also wrote an open letter to Apple Music, condemning its policy of offering a three-month free trial to attract subscribers.

### Questions

- (a) (10 points) Why was Singapore willing to provide substantial subsidies to Taylor Swift's team in exchange for exclusive performance rights?
- (b) (10 points) Currently, major streaming platforms include Spotify, Apple Music, KKBox, YouTube Music, and others, where users pay a fixed monthly fee for unlimited access to all music. In the long run, which of the four types of market structures do you think the music streaming industry will evolve into?
- (c) (10 points) Compared to the traditional physical album sales model, do you think music streaming platforms have a predominantly positive or negative impact on independent music producers?

## SECTION 3

### Problem 5 Bakery competition

Jenny Bakery is the sole shop in a small town that sells butter cookies. Its average total cost (ATC) is 200 units per cookie, and the annual demand for butter cookies in the town is  $Q = 1000 - \frac{1}{2}P$ .

Anna Bakery, recognizing the business opportunity in butter cookies, has conducted research and development to produce cookies with the same flavor as Jenny Bakery. However, due to less advanced technology, Anna Bakery's ATC is 320 units per cookie.

#### Questions

- (a) (10 points) If both bakeries simultaneously decide how many butter cookies to produce, what will be their respective quantities?
- (b) (5 points) If Jenny Bakery first decides how many butter cookies to produce, and Anna Bakery decides its production after observing Jenny Bakery's quantity, what will their respective quantities be?
- (c) (5 points) If Anna Bakery first decides how many butter cookies to produce, and Jenny Bakery decides its production after observing Anna Bakery's quantity, what will their respective quantities be?
- (d) (10 points) To expand its industry and maintain its monopoly, Jenny Bakery proposes an acquisition plan to Anna Bakery based on employment terms. Jenny Bakery will pay Anna an annual premium and provide production technology, but Anna Bakery must cancel its own brand and become a branch of Jenny Bakery. Can this acquisition proceed smoothly? If yes, what would be the amount? If no, explain why not.



## Problem 6 Economics modeling

Suppose there are two goods, A and B, in the market with the following demand and supply functions:

	Demand	Supply
A	$D_A = 800 - 3P_A + 5P_B$	$S_A = -100 + 2P_A + 4P_B$
B	$D_B = 800 + 2P_A - 3P_B$	$S_B = -50 + P_A + 2P_B$

### Questions

- (a) (5 points) What are the equilibrium prices and quantities of the two goods in the market?
- (b) (10 points) A new consumer enters the market and announces that they will buy 480 units of good A at any price. What are the new equilibrium prices and quantities of the two goods in the market?
- (c) (10 points) What is the relationship between goods A and B in terms of consumption and production?
- (d) (5 points) Provide examples of what goods A and B might be.

**END OF QUESTIONS**