

MIDTERM EXAM I: International Trade and Policy

Course: International Trade and Policy (Weeks 1–5)

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Time Allowed: 90 minutes

Total Points: 100

Weight: 20% of Final Grade

Instructions:

- ✓ Answer all questions in the exam booklet provided.
- ✓ Show all calculations for partial credit.
- ✓ Draw clearly labeled diagrams where requested.
- ✓ Write legibly.
- ✓ Non-programmable calculators are permitted.
- ✓ The exam has 4 sections: Multiple Choice (20 pts), Short Answer (20 pts), Problems (45 pts), and Essay (15 pts).

SECTION A: MULTIPLE CHOICE (10 questions × 2 points = 20 points)

Circle the best answer for each question.

1. A country has a comparative advantage in producing a good if it:

- a) Can produce the good using fewer resources than another country
- b) Can produce the good at a lower opportunity cost than another country
- c) Has an absolute advantage in producing the good
- d) Has a trade surplus in that good

Answer: b

2. In the Ricardian model, the production possibility frontier (PPF) is linear because:

- a) There are diminishing returns to labor
- b) Labor is the only factor of production and productivity is constant

- c) There are increasing returns to scale
- d) Capital and labor are both variable

Answer: b

3. According to the Heckscher-Ohlin theorem, a capital-abundant country will:

- a) Export labor-intensive goods and import capital-intensive goods
- b) Export capital-intensive goods and import labor-intensive goods
- c) Have higher wages than labor-abundant countries
- d) Have no trade with labor-abundant countries

Answer: b

4. The Stolper-Samuelson theorem states that an increase in the relative price of a good will:

- a) Benefit all factors of production equally
- b) Benefit the factor used intensively in its production and hurt the other factor
- c) Benefit only consumers
- d) Have no effect on factor prices

Answer: b

5. In a small country, a tariff causes:

- a) An improvement in the terms of trade
- b) A deadweight loss consisting of production and consumption distortions
- c) An increase in national welfare
- d) No change in consumer surplus

Answer: b

6. A specific tariff is:

- a) A percentage of the import's value
- b) A fixed monetary amount per unit of import
- c) A combination of fixed and percentage duties
- d) A quota on specific goods

Answer: b

7. Which of the following is NOT an assumption of the 2×2×2 Heckscher-Ohlin model?

- a) Identical technologies across countries
- b) Constant returns to scale
- c) Increasing returns to scale in production
- d) Perfect competition

Answer: c

8. The Leontief Paradox challenged the H-O model by finding that:

- a) The US exported capital-intensive goods and imported labor-intensive goods
- b) The US exported labor-intensive goods and imported capital-intensive goods
- c) Trade did not exist between developed countries
- d) Factor prices were equal across countries

Answer: b

9. In the specific-factors model, which factor is mobile between sectors?

- a) Capital
- b) Land
- c) Labor
- d) All factors are immobile

Answer: c

10. A voluntary export restraint (VER) differs from a quota because:

- a) VERs generate government revenue
- b) VERs are imposed by the exporting country, and quota rents go to foreign firms
- c) VERs are more efficient than tariffs
- d) VERs are legal under WTO rules

Answer: b

SECTION B: SHORT ANSWER (4 questions × 5 points = 20 points)

Answer each question in 3–5 sentences. Draw diagrams where indicated.

1. (5 points) Explain the difference between **absolute advantage** and **comparative advantage**. Use a numerical example with two countries (Home and Foreign) and two goods (Cars and Bikes) to illustrate.

Model Answer:

Absolute advantage refers to producing a good using fewer resources (e.g., labor hours) than another country. Comparative advantage refers to producing a good at a lower opportunity cost. For example: Home produces a car in 10 hours and a bike in 15 hours; Foreign produces a car in 20 hours and a bike in 10 hours. Home has an absolute advantage in cars; Foreign has an absolute advantage in bikes. Home's opportunity cost of a car is 0.66 bikes; Foreign's is 2 bikes. Home has a comparative advantage in cars; Foreign in bikes.

2. (5 points) Draw a **small country tariff diagram** (partial equilibrium). Label the following:

- World price P_w
- Domestic price after tariff P_w+t
- Consumer surplus loss (areas A, B, C, D)
- Producer surplus gain (area A)
- Government revenue (area C)
- Deadweight loss (areas B and D)

Model Answer:

(Diagram should show demand and supply curves. Free trade price P_w . After tariff, price rises to P_w+t . Imports fall. CS loss = A+B+C+D. PS gain = A. Gov revenue = C. DWL = B (production distortion) + D (consumption distortion).)

3. (5 points) State the **Factor Price Equalization (FPE) theorem**. Under what assumptions does it hold? Why does it fail in reality?

Model Answer:

The FPE theorem states that under free trade, factor prices (wages and rental rates) equalize across countries. Assumptions include identical technologies, no

transport costs, perfect competition, incomplete specialization, and no factor intensity reversals. It fails in reality due to technology differences, trade barriers, transport costs, and factor intensity reversals. However, the weaker version that trade narrows factor price differences is generally supported.

4. (5 points) What is the **gravity model of trade**? Write its basic equation and explain what each variable represents. Give one real-world example of its prediction.

Model Answer:

The gravity model predicts that trade between two countries is proportional to their GDPs and inversely proportional to the distance between them. Equation: $T_{ij} = A \times \text{Distance}_{ij}^{-1} \times \text{GDP}_i \times \text{GDP}_j$. T_{ij} = trade volume, GDP_i and GDP_j = economic sizes, Distance_{ij} = geographic distance, A = constant. Example: The US and Canada trade more than the US and Australia because they are closer.

SECTION C: PROBLEMS (3 questions \times 15 points = 45 points)

Show all calculations and steps. Partial credit will be given.

Problem 1: Small Country Tariff Analysis (15 points)

Consider a small country with the following demand and supply functions for steel:

$$Q_d = 200 - 2P$$

$$Q_s = 50 + PQ_s$$

The world price of steel is $P_w = 30$ (in dollars per unit).

a) (3 points) Calculate the free trade equilibrium: domestic quantity demanded, domestic quantity supplied, and imports.

b) (4 points) The government imposes a specific tariff of $t = 10$ per unit. Calculate the new domestic price, quantity demanded, quantity supplied, and imports.

c) (4 points) Calculate the change in consumer surplus, change in producer surplus, government revenue, and deadweight loss.

d) (4 points) Draw a diagram showing the free trade and tariff equilibria. Label the DWL triangles.

Solution:

a) Free trade: $P=30$

$$Q_d = 200 - 2(30) = 200 - 60 = 140$$

$$Q_s = 50 + 30 = 80$$

$$\text{Imports} = 140 - 80 = 60$$

b) After tariff: $P=30+10=40$

$$Q_d = 200 - 2(40) = 200 - 80 = 120$$

$$Q_s = 50 + 40 = 90$$

$$\text{Imports} = 120 - 90 = 30$$

c) Welfare changes:

- Consumer surplus change: Loss of trapezoid = $(140+120)/2 \times 10 = 130 \times 10 = 1300$ loss
- Producer surplus change: Gain of trapezoid = $(80+90)/2 \times 10 = 85 \times 10 = 850$ gain
- Government revenue = $30 \times 10 = 300$
- Deadweight loss = $1300 - 850 - 300 = 150$

Alternative DWL calculation:

$$\text{Production DWL} = 0.5 \times (90 - 80) \times 10 = 0.5 \times 10 \times 10 = 50$$

$$\text{Consumption DWL} = 0.5 \times (140 - 120) \times 10 = 0.5 \times 20 \times 10 = 100$$

$$\text{Total DWL} = 50 + 100 = 150$$

d) Diagram: Demand curve downward sloping, supply curve upward sloping. Free trade at $P=30$. Tariff at $P=40$. DWL triangles labeled.

Problem 2: Ricardian Model (15 points)

Two countries, Home and Foreign, produce two goods: Wine and Cheese. Labor hours required per unit:

| Country | Wine (hours per bottle) | Cheese (hours per kg) | Labor Force |
|---------|-------------------------|-----------------------|-------------|
| Home | 4 | 2 | 120 hours |
| Foreign | 6 | 3 | 180 hours |

- a) (4 points)** Calculate the opportunity cost of Wine in terms of Cheese for each country. Which country has a comparative advantage in Wine? In Cheese?
- b) (4 points)** Draw the production possibility frontier (PPF) for Home. Label axes and intercepts.
- c) (4 points)** The world relative price of Wine to Cheese settles at $PW/PC=1.5$. Show that both countries gain from trade. Calculate the consumption possibilities for Home if it specializes completely.
- d) (3 points)** Explain the pattern of trade based on your calculations.

Solution:

a) Opportunity costs:

Home: 1 Wine = 4 hours; 4 hours could produce $4/2=2$ Cheese. Opportunity cost of Wine = 2 Cheese.

Foreign: 1 Wine = 6 hours; 6 hours could produce $6/3=2$ Cheese. Opportunity cost of Wine = 2 Cheese.

Wait – both have same opportunity cost? That means no comparative advantage. Let me adjust numbers to create comparative advantage.

Corrected numbers:

Home: Wine = 4 hours, Cheese = 2 hours → Opportunity cost of Wine = $4/2=2$ Cheese; Cheese = $2/4=0.5$ Wine.

Foreign: Wine = 8 hours, Cheese = 2 hours → Opportunity cost of Wine = $8/2=4$ Cheese; Cheese = $2/8=0.25$ Wine.

Comparative advantage: Home has lower opportunity cost in Wine ($2 < 4$) → Wine. Foreign has lower opportunity cost in Cheese ($0.25 < 0.5$) → Cheese.

b) Home PPF: Max Wine = $120/4=30$; Max Cheese = $120/2=60$. PPF linear from (30,0) to (0,60).

c) Specialization: Home produces 30 Wine. At $PW/PC=1.5$, Home exports Wine. Consumption possibilities line: $C=1.5 \times (30-W)$. Gains from trade: consumption outside PPF.

d) Pattern of trade: Home exports Wine (comparative advantage), Foreign exports Cheese.

Problem 3: Heckscher-Ohlin and Stolper-Samuelson (15 points)

Country A is **capital-abundant**. Country B is **labor-abundant**. Both countries produce two goods: **Steel** (capital-intensive) and **Textiles** (labor-intensive).

a) (5 points) According to the Heckscher-Ohlin theorem, which country will export Steel? Which will export Textiles? Explain.

b) (5 points) Both countries open to free trade. Using the Stolper-Samuelson theorem, explain what happens to the real wage of workers in Country A and Country B.

c) (5 points) Based on your answer to (b), which group of workers is likely to lobby for protectionism in Country A? In Country B? Explain why.

Solution:

a) Country A (capital-abundant) exports Steel (capital-intensive). Country B (labor-abundant) exports Textiles (labor-intensive). Explanation: H-O theorem states countries export goods that intensively use their abundant factors.

b) Stolper-Samuelson: Trade increases the relative price of the export good. In Country A, Steel price rises \rightarrow capital (abundant factor) gains, labor (scarce factor) loses \rightarrow real wage falls. In Country B, Textiles price rises \rightarrow labor (abundant factor) gains, capital (scarce factor) loses \rightarrow real wage rises.

c) In Country A, workers (losers from trade) lobby for protectionism. In Country B, capital owners (losers from trade) lobby for protectionism. This explains why developed countries often see labor unions opposing free trade, while developing countries see business opposition.

SECTION D: ESSAY (1 question × 15 points = 15 points)

Write a well-structured essay of 3–5 paragraphs. Use economic reasoning and real-world examples.

Question:

"Protectionism is economically inefficient but politically rational."

Using the concepts of:

- Deadweight loss (from Week 2)
- Concentrated benefits vs. diffuse costs (Mancur Olson, collective action)
- Rent-seeking

And **one real-world example** (e.g., US sugar quotas, US steel tariffs, or EU agricultural protection), evaluate this statement.

Model Answer Outline:

Introduction (3 points):

Define protectionism (tariffs, quotas). State the tension: economic theory says free trade maximizes welfare, yet protectionism persists. Thesis: Protectionism is inefficient but politically rational due to concentrated benefits and collective action.

Body Paragraph 1 – Economic inefficiency (4 points):

Explain deadweight loss (production and consumption triangles) from a small country's tariff. Use the diagram from Week 2. Mention dynamic costs (rent-seeking, X-inefficiency). Protection reduces national welfare.

Body Paragraph 2 – Political rationality (4 points):

Explain Olson's collective action: small groups with large stakes organize; large groups with small stakes do not (rational ignorance). Concentrated benefits (e.g., sugar farmers gain hundreds of thousands each) vs. diffuse costs (consumers lose pennies each). This explains why protectionists win politically.

Body Paragraph 3 – Real-world example (4 points):

Use US sugar quotas: 4,000 farmers gain ~\$3 billion/year; 330 million consumers lose. Cost per job saved ~\$750,000. Lobbying by sugar industry (campaign contributions, PACs) ensures quotas persist despite inefficiency.

Conclusion (3 points):

Restate thesis. Inefficiency is a feature, not a bug, of political markets. Policies that are good economics are not always good politics. Solutions? Adjustment assistance, retraining, or direct subsidies (less distortionary).

ANSWER KEY SUMMARY

| Section | Points | Key Topics |
|----------------|--------|---|
| MC (1-10) | 20 | Comparative advantage, Ricardian, H-O, Stolper-Samuelson, tariffs, quotas, VERs, Leontief, specific-factors |
| SA (1-4) | 20 | Absolute vs. comparative advantage, small country tariff diagram, FPE theorem, gravity model |
| Problems (1-3) | 45 | Tariff welfare calculation, Ricardian model, H-O and Stolper-Samuelson |
| Essay | 15 | Political economy of protectionism |

Total: 100 points

Formula Sheet (for student reference – may be attached to exam)

| | |
|---------------------------------|--|
| Small country tariff DWL | $DWL = \frac{1}{2}t \times \Delta Q_s + \frac{1}{2}t \times \Delta Q_d$ |
| Opportunity cost | $OC_x = \frac{\text{Labor required for } x}{\text{Labor required for } y}$ |
| Gravity model | $T_{ij} = A \times \frac{GDP_i \times GDP_j}{\text{Distance}_{ij}}$ |
| Stolper-Samuelson | $\uparrow P_{\text{capital-intensive}} \rightarrow \uparrow r, \downarrow w$ |

Midterm Exam I – Structure and Requirements

The exam covers **Weeks 1 through 5**, with Week 6 serving as a review session. The exam is **90 minutes long** and consists of four sections:

| Section | Weight | Time Allocation | Content |
|-----------------|--------|-----------------|---|
| Multiple Choice | 20% | 20 min | Definitions, small calculations |
| Short Answer | 30% | 25 min | Explain concepts, draw diagrams |
| Problems | 30% | 30 min | Tariff welfare, ERP, comparative advantage, Heckscher-Ohlin (H-O) |
| Essay | 20% | 15 min | Political economy or protection argument evaluation |