

Problem Set 3

Due Friday, April 17th at 3:30pm

Problem 1: True, false, or uncertain

Please *evaluate* whether each statement is true, false, or uncertain. Use economic reasoning, graphical analysis, or evidence discussed in class.

1. Unlike the Ricardian model, the Specific Factors model always guarantees gains from trade.
2. If a country discovers new oil reserves, the price of oil will decrease due to the resulting oversupply.
3. If the wage of mobile workers in a sector decreases because of a shock, we can conclude that some mobile workers moved from that sector to another.
4. When the price of a good falls in the world market, mobile workers might still receive the same nominal wage w as before if the endowment of the specific factor in another sector increases.

Problem 2: Immigration and world equilibrium

Consider two countries, Home and Foreign, that produce cloth (C) and food (F) using

$$Q_C = \sqrt{K} \sqrt{L_C}, \quad Q_F = \sqrt{T} \sqrt{L_F},$$

with $L_C + L_F = \bar{L}$. Labor is mobile across sectors within a country but cannot move internationally. Capital (K) is specific to cloth and land (T) is specific to food. Both countries have preferences $U = C^{1/2} F^{1/2}$, so $RD(p) = 1/p$.

Use the lecture formulas: $RS_i(p) = (K_i/T_i) \cdot p$ and $p_i^A = \sqrt{T_i/K_i}$.

Endowments:

	K	T	$\bar{L}$
Home	100	100	100
Foreign	25	400	100

1. For each country, sketch the PPF and label the intercepts. What is each country's autarky relative price? In which country is cloth relatively cheaper?
2. Sketch Home's relative supply curve RS_H and Foreign's RS_F on the same diagram. On a separate diagram, sketch the world relative supply RS_W and relative demand RD , and mark the free-trade equilibrium at $p^W = 2$.
3. At $p^W = 2$, mark each country's production point on its PPF. Using the fact that each country spends half its income on each good, find each country's consumption bundle and trade pattern. Which country exports cloth?

You may use the lecture result: at $p = 2$, Home produces $(Q_C, Q_F) \approx (89.4, 44.7)$ and Foreign produces $(Q_C^*, Q_F^*) \approx (22.4, 178.9)$.

4. Now suppose immigration raises Home's labor endowment from $\bar{L} = 100$ to $\bar{L}' = 200$, while Foreign's endowments are unchanged. Sketch Home's new PPF on the same diagram as the original. Does Home's own relative supply curve RS_H shift? Explain briefly.
5. Even though RS_H does not shift, does the **world** relative supply curve RS_W shift? *Hint: the world RS is a weighted average of the country RS curves, where the weights depend on each country's share of world output. Think about what happens to those weights when Home becomes larger.* On your world RS–RD diagram, sketch the new $RS_{W'}$ and determine whether the world relative price of cloth **rises, falls, or stays the same**. Explain.
6. Using your diagrams, explain how the immigration affects: (i) production in each country, (ii) the gains from trade for Home and for Foreign. *A clear verbal/graphical answer is sufficient—no computation required.*
7. The fall in p^W means the relative price of cloth has decreased worldwide. Focusing on this price change and holding each country's endowments fixed, use the lecture results on winners and losers to explain who gains and who loses *within each country* (capital owners, land owners, and workers). Then briefly comment on the additional direct effect of Home's larger labor force on Home's factor incomes. *A clear verbal answer is sufficient.*

Problem 3: South Korea, Vietnam, semiconductors, and rice

South Korea and Vietnam each produce two goods: semiconductors (S) and rice (R). In each country, labor is mobile across sectors, fab capital (K) is specific to semiconductors, and agricultural land (T) is specific to rice. Production is

$$Q_S = \sqrt{K} \sqrt{L_S}, \quad Q_R = \sqrt{T} \sqrt{L_R}.$$

Both countries have preferences $U = S^{1/2} R^{1/2}$, so $RD(p) = 1/p$, where $p \equiv p_S/p_R$.

Use the lecture formulas: $RS(p) = (K/T) \cdot p$ and $p^A = \sqrt{T/K}$.

Both countries have $\bar{L} = \bar{L}^* = 100$ workers. Specific-factor endowments are:

	Fab capital K	Land T
South Korea	80	180
Vietnam	20	720

1. Draw the PPF for each country and label the intercepts. Find each country's autarky relative price. In which country are semiconductors relatively cheaper?
2. Sketch South Korea's and Vietnam's relative supply curves. On a world RS–RD diagram, explain why the free-trade price must lie between the two autarky prices. Verify that $p^W = 3$ clears world markets.

3. At $p^W = 3$, find each country's production and consumption bundles. Plot both on each PPF. What does each country export and import? Verify that world markets and trade balances clear.
4. Show graphically that both countries gain from trade. In words, explain why trade creates gains here even though both countries still produce *both* goods.
5. Now suppose South Korea invests in expanding its fab capital stock, raising K while all other endowments (T , K^* , T^* , $\bar{L}$, $\bar{L}^*$) remain unchanged. How does this affect: (i) South Korea's PPF, (ii) South Korea's autarky price, and (iii) South Korea's RS curve? Sketch the changes on your diagrams.
6. Using a world RS–RD diagram, explain what happens to the world relative price of semi-conductors after Korea's capital expansion. Then, focusing on the induced price change and holding endowments fixed, explain who wins and who loses **within each country** (capital owners, land owners, and workers). Finally, briefly discuss the additional direct effect of Korea's higher K on Korea's own factor returns. *A clear verbal/graphical answer is sufficient—no computation required.*