

Answer the following questions in a large blue book. Don't be too wordy, of course, but make sure that you clearly answer each and every question.

1. (10%) Consider the incentives to save and invest in two countries, Japan and China. Japan is a mature market economy with a large capital stock and diminishing marginal returns for investors, while China is a small emerging economy with a high marginal return on investment. Assume both economies are equally risky, and they have identical preferences for current and future consumption.

- a) Using a model of intertemporal trade (i.e., with PPFs and indifference curves), with current consumption on the horizontal axis, show the autarky amount of savings and investment for both countries.
- b) If savings were allowed to flow internationally, which direction would it flow, and what would happen to domestic investment and future output in each country?
- c) In the present, which country would have a trade surplus in the present, and which would have a deficit? What about in the future?

2. (10%) Consider two economies, Home and Foreign. Trade is initially balanced between them. However, foreign savers suddenly find themselves inexplicably attracted by a higher rate of return in Home's market (which is perhaps helped by Home's macroeconomic stability, secure property rights, and efficient capital markets), and so they decide to transfer a substantial amount of their savings to Home, where they can be invested in productive assets.

- a) How would this transfer of foreign savings affect the current account balance at Home?
- b) How would this transfer affect the exchange rate for Foreign currency?
- c) How would this transfer affect current overall spending and current welfare in Home?
- d) How would this transfer affect the volume of exports and the volume of imports at Home?
- e) If the price and income elasticities for Home's exports and imports are identical, how would this transfer affect Home's terms of trade?
- f) Putting Home's export good on the horizontal axis, draw Home's PPF and show its free trade equilibrium both before and after the transfer. Assuming its terms of trade are unaffected, show how the above transfer affects its production, its overall spending, and its volume of exports and imports.

3. (15%) Suppose there are only two countries trading in steel, the U.S.A. and "East Asia." Assume the countries are similar in size, but East Asia has a comparative advantage in steel production.

- a) Using separate supply and demand diagrams for each country, show the free trade equilibrium relative to the autarky price.
- b) On these same diagrams, show the effect of a non-prohibitive specific tariff placed on steel imports by the U.S. government.
- c) Carefully labeling the areas, explain the resulting changes in consumer surplus, producer surplus, and government revenue in the each country. Does the tariff improve or worsen overall welfare in the U.S.? In East Asia? Overall?

4. (10%) If at first glance quotas are equivalent to tariffs in their effects on imports (you should show this), why do economists consider quotas to be much less preferable? Explain.

5. (25%) The United States is a major exporter of agricultural products such as cotton, and has a significant effect on the world price. The U.S. government provides a significant production subsidy to U.S. farmers, often equal to as much as two-thirds of the costs of production. The market is very competitive, and though individual producers have significant internal economies of scale the overall market exhibits the standard upward sloping marginal cost (supply) curve.

- a) Show a graph for the U.S. cotton market, for both market equilibria (with and without the government subsidy). What happens to the market price of cotton, domestic production of cotton, and the domestic consumption of cotton?
- b) Using your graph, explain the distributional effects of the subsidy on domestic producer surplus, domestic consumer surplus, and the government budget. Assuming there are no externalities from cotton production, what happens to overall welfare in the United States?
- c) Explain why this production subsidy has different effects than an export subsidy.
- d) Using another graph for the cotton market in East Asia, which has few cotton producers but a large textile industry, show the effects of the U.S. production subsidy on Asian prices, production, consumption, producer surplus, consumer surplus, and overall Asian welfare.
- e) Use another graph for the cotton market in Africa, where farmers have a comparative advantage, and explain the effects of the U.S. subsidy on African cotton producers, consumers, and overall African welfare.
- f) Finally, use one more graph combining U.S. export supply and foreign import demand (we can ignore Africa here because its cotton industry is small), and show the effects of the subsidy on domestic and foreign prices and the volume of trade. Don't worry here about the difference between a production subsidy and an export subsidy. Use this graph to explain the net efficiency effects of the subsidy on both home and foreign countries. Your answer should match that given in parts a, b, and d, more or less.

6. (20%) The U.S. both produces and imports petroleum, which is then converted into gasoline, heating oil, and other byproducts. Consumption of these petroleum byproducts has a significant external (spillover) cost, including air pollution, urban sprawl, congestion, noise, fatalities, and global warming. Suppose that the Administration begins to take this external cost seriously, and is considering alternative policies. Assume that the current world price of petroleum is \$50 per barrel, and at that price the U.S. produces 9 million barrels per day and consumes 22 million barrels per day. Suppose that U.S. imports do not significantly affect the world price of oil (this is absurd, of course, but I want to keep the problem simple).

- a) Suppose that the U.S. government adds a \$20 tariff to each barrel of imported oil, and this raises the domestic price to \$70, increases daily domestic production to 11 million barrels, and decreases consumption to 18 million barrels. Show, calculate and explain the effects of this tariff on domestic producer surplus, domestic consumer surplus, and the government budget. In the absence of an externality, would this tariff improve or worsen efficiency?
- b) Suppose that the marginal external cost of petroleum consumption, as discussed above, is an additional \$40 per barrel. Would the \$20 tariff improve or worsen efficiency?
- c) Suppose that the U.S. government instead puts a \$20 tax on all petroleum consumed in this country, whether imported or not. Explain how this tax would affect domestic producer surplus, domestic consumer surplus, the government budget, and the consumption externality. Would this tax improve or worsen efficiency, relative to the \$20 tariff?
- d) Which is the optimal policy to correct this externality, an import tariff or a consumption tax? What is the optimal amount of the tariff or tax?

7. (10%) What is the World Trade Organization? How does it work, how did it evolve, what are its key principles, and what are some of its major rules? What are its successes, and what are its current problems?

For Problem 1:

- a) Write out the equations for the intertemporal trade model, and show these amounts on a diagram for Japan.
- b) Using income and substitution effects (assuming consumption now and later are both normal goods), show how the transfer affects current and future consumption and savings in both countries.
- c) Then algebraically demonstrate that if (1) output (Q) equals consumption (C) plus investment (I) plus net exports (NX), (2) income (Y) equals consumption (C) plus domestic savings (S_D), (3) Investment is financed by either domestic savings or foreign savings (S_F), and (4) income equals output, then (5) net exports plus foreign savings must equal zero.

For Problem 2:

- a) Use the equation $P_x(Q_x - C_x) - P_y(C_y - Q_y) + T = 0$ for the Home country, where P is price, Q is production, C is consumption, X is the export good, Y is the import good, and T is the transfer, to show how the transfer is offset by changes in consumption even if the terms of trade are unaffected.
- b) Draw a diagram for the foreign currency market, and explain how the transfer affected the exchange rate and the quantity of exports.
- c) If the demand for Home's export good is more elastic, in both price and income, than the demand for its import good, how would this transfer affect Home's terms of trade?

For Problem 5:

Assume that in the U.S. the demand for cotton is $Q_D = 200 - 50P$ and the supply is $Q_S = 100P - 100$, in East Asia demand is also $Q_D = 200 - 50P$ but supply is $Q_S = 25P - 25$, and in Africa demand is $Q_D = 30 - 10P$ but supply is $Q_S = 40P - 20$.

- a) Solve for each country's autarky price and quantity, and then solve for the free trade equilibrium. How much would each country import or export under free trade?
- b) How much does each country benefit overall from trade?
- c) Suppose the U.S. government gives cotton producers a subsidy of \$3 per unit, so that U.S. supply now becomes $Q_S = 100(P+3) - 100$. How does this affect the world's equilibrium trading price, how much does it affect each country's exports or imports, and how much does each country gain or lose as a result of the subsidy?

For Problem 6(d):

- a) Solve for the effects of the optimal policy, in the optimal amount, on domestic producer surplus, domestic consumer surplus, the government budget, and the consumption externality.
- b) Demonstrate that this net efficiency effect is a "maximum," by varying the optimal amount of the tariff or subsidy up and down by \$5, and solving for it all again.