

**Final examination****Scores add up to 100**

Your name: \_\_\_\_\_ SID: \_\_\_\_\_ Your TA: \_\_\_\_\_

**Answer 8 out of the 10 questions 1 to 10 (4.5 points each, 8 minutes each). Do not answer more than 8 questions.**

1. For each of the three models that explain trade based on comparative advantage (Ricardo, Specific-factors, and Heckscher-Ohlin), give the basis of comparative advantage and the trade pattern.

**In the Ricardian model, labor is the only factor of production and countries will have a comparative advantage in the good that their labor produces relatively efficiently, i.e. the good that has a lower domestic opportunity cost. Countries will export the good in which they have comparative advantage while importing the good that their labor produces relatively inefficiently.**

**In the Specific Factors model, there are two fixed, specific factors and one mobile factor. Countries will have a comparative advantage in the good that requires the specific factor in relative abundance (where relative abundance is defined by comparing ratios of specific factors across countries). Countries will export the good in which they have comparative advantage and import the good that requires the specific factor that is relatively scarce domestically.**

**In the Heckscher-Ohlin model, countries have a comparative advantage in the good that uses *intensively* the factor a country has in relative abundance. It will export the good in which it has comparative advantage and import the good that uses *intensively* the factor that is relatively scarce domestically.**

2. Assume that California and Mexico produce tomato and nuts with only one factor, labor. Labor requirements in California are 50 man-hours per ton of tomatoes and 150 man-hours per ton of nuts. In Mexico, labor requirements are 60 man-hours per ton of tomatoes and 250 man-hours per ton of nuts. What is the range of relative wages  $w_{\text{mex}} / w_{\text{cal}}$  that would make trade between California and Mexico beneficial for both countries?

$$a_T=50 \quad a_N=150; \quad a_T^*=60 \quad a_N^*=250$$

**Nuts more cheaply produced at in California if  $a_N w < a_N^* w^* \Rightarrow 150w < 250w^* \Rightarrow w/w^* < 250/150 = 5/3$**

**Tomatoes more cheaply produced in Mexico if  $a_T^* w^* < a_T w \Rightarrow 60 w^* < 50w \Rightarrow w/w^* > 5/6$**

**For  $5/6 < w/w^* < 5/3$  both countries find it cheaper to import a good from abroad and thus benefit from trade.**

3. State the factor-price equalization theorem. Make sure to state the underlying assumptions.

**The factor-price equalization theorem says that because the relative price of labor is increasing in the relative price of the labor-intensive good, the convergence of output prices with the opening of trade also leads to a convergence of input prices across countries.**

**The assumptions of the Heckscher-Ohlin model which are central to this result are: (1) that both countries produce both goods and (2) that technologies are the same across countries.**

4. Describe a trade theory that could explain trade between identical countries. To what type of commodities does it apply? Does the theory imply gains to trade? If no, why not? If yes, what is the source of these gains?

**The theory monopolistic competition under internal economies of scale would explain trade between identical countries. In this model, costs are not based on endowment differences but rather on firm size. Countries with the large firms will export goods and are likely also to import from large firms in other countries.**

**The existence of substantial fixed costs generates the advantages to size: only large firms will have the low average costs necessary to be competitive. For this reason, we expect to see trade between identical countries in goods with large fixed costs: machine tools, automobiles, aircraft, etc.**

**There are two sources of gain from this type of trade (1) the decrease in price that results from expanding the market and spreading out the fixed costs over more units of output and (2) the increase in product variety available to consumers under free trade. These gains must be weighed against the costs incurred in the exit of some firms.**

5. In our model of intertemporal trade, what do countries exchange? What differences in their intertemporal PPFs make this exchange mutually beneficial?

**In this model, countries trade present and future consumption of a single good. If a country's first period production exceeds its first period consumption, it exports present consumption and is *loaning* consumption in the first period to be repaid with consumption goods from abroad in the second period. Conversely, the foreign country *borrow*s in the first period (production in period one is less than consumption) and repays by producing more than it consumes in the second period. Each country is on a higher aggregate indifference curve than would be possible under autarky.**

**For this mutually-beneficial trade to take place, there must be different autarky relative prices of current consumption. This implies different autarky interest rates (since the price of present consumption in terms of future consumption is  $1+r$ ). These differences can be generated by differences in intertemporal PPFs, which correspond to differences in investment opportunities. The country with higher interest rate has better investment opportunities.**

6. State the infant industry argument for protection. What are the conditions for success? Why might it eventually fail?

**According to the infant industry argument, although an industry may currently be unable to compete internationally, if it gains production experience it will become more efficient and become competitive internationally. If the government will temporarily protect the industry, selling to the domestic market will provide production experience that improves industry efficiency and ultimately permit the removal of trade restrictions.**

**For this policy to succeed, industry efficiency needs to increase with initial production experience and for established countries not to improve efficiency further while the domestic industry is protected. Firms must believe that protection will be removed and so have an incentive to improve efficiency. Such a policy often fails because firms do not believe restrictions will be removed, in part because they are able to lobby the government for continued protection.**

7. Define the "most favored nation" principle of GATT.

**The "most favored nation" (MFN) principle requires that the reduction of trade restrictions afforded to one country must be extended to every country with MFN status. If, for example, the U.S. agrees with Germany to lower its tariff on imported German machinery, the new tariff rate applies to machinery from any other nation with MFN status, and not just to Germany. MFN is thus a guarantee that exporters will pay the same low tariff as those enjoyed by the "most favored nation." Tariff reduction under GATT generally took place via this MFN mechanism.**

8. Suppose that the world price of automobiles is \$10,000 and domestic producers of automobiles use \$5,000 worth of imported inputs and no domestic inputs. What rate of effective protection would be provided to the domestic auto industry by a 25% tariff on imported automobiles and a 50% tariff on inputs?

$$EP = \frac{(10,000 * 1.25 - 5,000 * 1.5)}{5,000} = \frac{12,500 - 7,500}{5,000} = 1 \implies \text{rate of protection is 0}$$

**The auto industry is no more or less protected under this policy than under free trade.**

9. Let's say that Brazil can produce automobiles relatively cheaply, but that they have low fuel efficiency and produce high level of gas exhaustion. The U.S. government, concerned about clean air in the U.S., could impose a tariff on imports of autos from Brazil.

1. What is the nature of the market failure that justifies government intervention? (be concise but precise on why it is a market failure)
2. Explain why imposing a tariff is second-best and what would be the first-best policy.

**1. Use of Brazilian car produces externalities, i.e., cost to the society that are not borne by the user. This requires government intervention to force the internalization of these externalities.**

**2. A tariff will induce the decrease in the use of Brazilian car, which therefore bring the consumption closer to the level that should be optimal. But at the same time it increase domestic price of all cars. Since the other cars are not polluting, this increase in price is not justified. It induces more production and less consumption of domestic cars that is optimal.**

**A better policy would be to put a tax on fuel efficiency or on exhaustion.**

10. Politicians in the U.S. are worried that immigration is a drain on the public purse. According to the article from *The Economist* of November 1997:

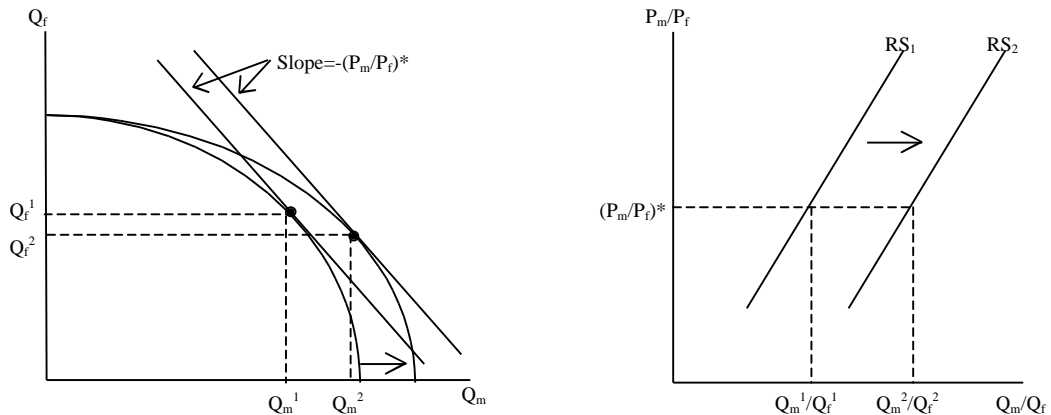
1. Are those fears justified?
2. What immigration policy could reduce costs to the public budget and improve the pool of immigrants from the U.S. point of view?

1. They could be justified if some immigration is really motivated by getting access to a country that has higher medical and social protection. So that the pool of immigrant that come to a country is disproportionately using the welfare system.

However the facts are that immigrants to the U.S. do tend to cost to the public budget (except those with higher education), but at the second generation this is reversed. So the fear is a short sighted view on immigration.

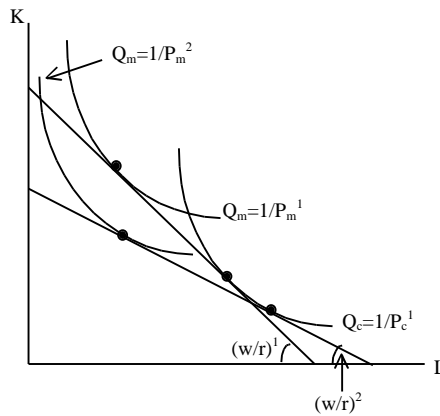
2. Nevertheless, there are proposition to base immigration rules on economic criteria: by establishing rules of admission or quotas based on the desirability of certain categories of migrants. Current examples are the increased quotas for scientific, and the farm workers guest workers.

11. Use a PPF graph to explain how the increase in the endowment of a specific-factor affects the relative supply curve of a country.



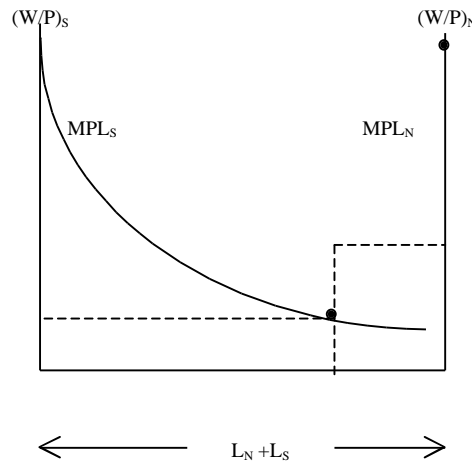
Consider two goods, manufactures (m) and food (f). Manufactures are produced using labor and the specific factor capital, whereas food is produced labor and the specific factor land. At any given relative prices, the tangency between the production possibilities frontier (PPF) results in a given relative supply level  $Q_m/Q_f$ . By considering different price levels we can trace the relative supply curve RS. When the economy's endowment of capital increases, the PPF will shift out along the  $Q_m$  axis. As depicted above, at any given prices the economy will now produce relatively more manufactures than food, compared to the original situation. Thus, the RS curve shifts rightward to  $RS_2$ .

12. Consider a Heckscher-Ohlin economy that produces two goods with labor and capital. Explain with a graph how the increase in the relative price of the capital-intensive good affect the relative factor price  $w/r$  (i.e., the wage rate over the rental rate).



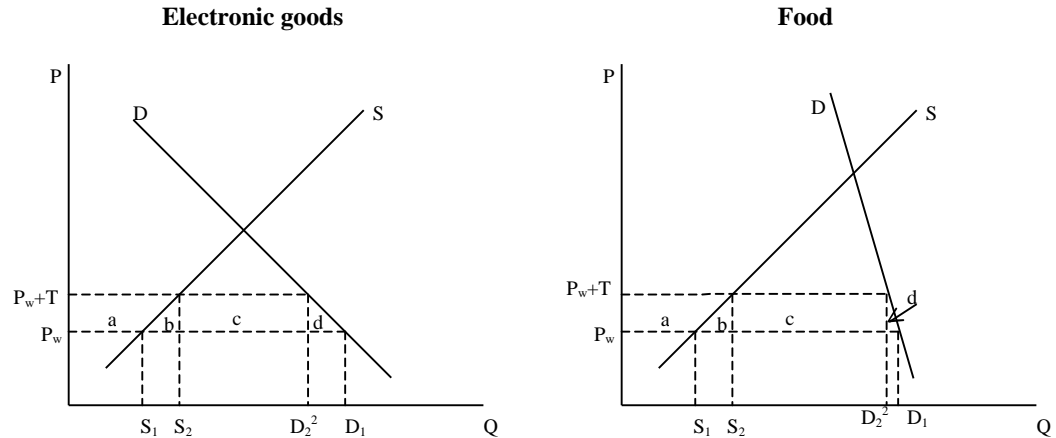
The original relative factor price  $(w/r)^1$  is given as the tangency line between the \$1-isoquant curves of goods m and c (as drawn, m is capital intensive). When the price of the capital intensive good m goes up from  $P_m^1$  to  $P_m^2$ , less output of good m is needed to produce \$1 worth of output, so the isoquant shifts toward the origin. Then, the new relative factor price  $(w/r)^2$  is now lower than before.

13. Assume two countries, a fixed factor land and a variable factor, labor, with diminishing marginal productivity, and a single good. Show on a graph how labor mobility between the two countries can raise world output. What are the implications for wages and the returns to land in the two countries?



At first,  $O_s1$  workers live in country S and earn a real wage given by point C; in country N there are  $ON1$  workers earning a real wage given by point F (higher than C). Output in each country is given by the area under the MPL curve, up to the size of the labor force. Thus, country S produces output equal to area  $AOs1B$  and country N output is equal to  $DON1F$ . When migration is allowed, workers in S move to country N until the real wage in the two countries is equalized at level  $H=I$ . The size of such migration is given by the length of segment 1-2. We conclude that real wages in S rise but they fall in N. Moreover, the lesser (greater) availability of labor in country S (country N) reduces (increases) the real return to land. Last, output in country S is equal to area  $AOs2G$  and in country N it is equal to area  $DON2G$ . Therefore, world output has risen by area  $EGB$ .

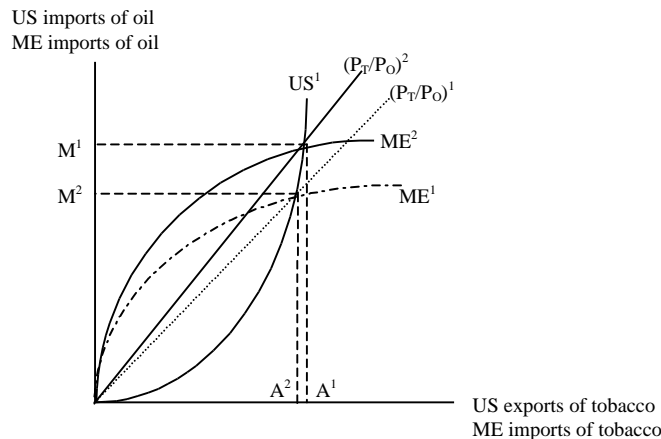
14. Consider two commodities, food and electronic goods. Assume that the two commodities only differ by their demand price elasticity: The two commodities have the same supply curve, the same world price, and at this world price the same level of demand. Demand for food is inelastic and demand for electronic goods is elastic. Draw two graphs, one for the market for food and one for the market for electronic goods. Compare the effect of the same tariff on the change in consumer surplus, efficiency loss, and tariff revenue in the two markets? Use this result to describe the dilemma of using trade taxes to raise government revenue.



In both graphs:  $\Delta CS = -(a+b+c+d)$ ;  $\Delta PS = a$ ; tariff revenue =  $c$ ; efficiency losses =  $(b+d)$ . Since food consumption is inelastic, consumers cannot substitute away from food when the tariff is imposed. Consequently, area  $d$ , which represents consumption efficiency losses, is greater in the electronic goods market, and area  $c$ , tariff revenues, are greater in the food market. (Areas  $a$  and  $b$  have the same size in both graphs.) We can also see that the consumer surplus falls by more in the food market.

Therefore, we conclude that imposing a tariff on food production results in less efficiency losses but that this is accomplished to the expense of consumers.

14. A free trade equilibrium exists in a two-region, two-product world. The United States exports tobacco to the Middle East and imports oil from the Middle East. Show how an increased taste for smoking in the Middle East affects its offer curve, and the U.S. terms of trade.



As the taste for smoking increases in the Middle East, Middle Eastern countries will be willing to import more tobacco from the United States at any given world relative price. Graphically, this implies that the Middle East offer curve  $ME$  rotates counter-clockwise to  $ME^2$ . The resulting world relative price, identical to the U.S. terms of trade, has increased to  $(P_T/P_0)^2$ .

## 16 Dumping

16.1. What is the economic definition of dumping? Explain briefly how selling prices are determined on the domestic and the foreign market.

**Dumping is price discrimination against the foreign market. The producer needs to have monopoly power in the domestic market. It can then charge the monopoly price domestically while maintaining the international price on the foreign market.**

16.2. What are the conditions required to make dumping possible?

**Requires monopoly power on the domestic market and the ability to segment the two markets, i.e., to prevent re-imports of the commodities sold on the foreign market**

16.3. What is the WTO definition of dumping?

**WTO definition of dumping is:**

- price on the foreign market needs to be below a "fair price"
- this low price needs to impose "material injury" to the industry in the foreign country

"Less than fair price" can be :

- either foreign price less than price in the home market
- or foreign price less than in a third country
- or foreign price lower than the cost of production.

**Cost of production are themselves evaluated by the WTO commission, based on standard costs. These calculations can be quite controversial, hence abundance of disputes.**

16.4. If a country is found by a WTO dispute panel to have been dumping, what action can the international agency take?

**The WTO condemn the country and ask that something been done to correct the violation of the trade rules. But the WTO is not a supra national government and cannot enforce or punish.**

**(Note that the injured country is allowed to put a duty to exactly offset the price discrimination)**

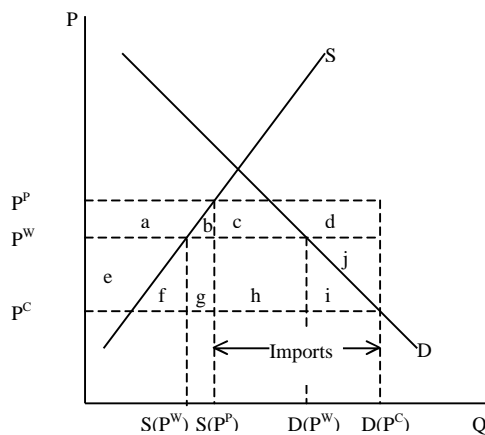
## 17. The cost of a food security policy

Nigeria is a small rice importing country. Suppose that Nigeria wants to give rice farmers higher prices than the world prices, yet wants to make rice price to consumers less than the world price, to keep down the cost of living.

17.1. Describe a policy or set of policies that could do this

**This outcome can be accomplished by imposing a tariff on rice imports, thereby increasing the price received by producers to  $P^P$ . In addition, consumers are offered a subsidy in the amount  $(P^P - P^C)$  per unit consumed so as to reduce the price they faced to  $P^C$ .**

17.2. Show on a graph its (their) effects on production, consumption and imports, and the welfare effects (on producers, consumers, government budget, and overall welfare).



$$PS = a$$

$$CS = e+f+g+h+i$$

$$G = -(a+b+e+f+g+h+i+j)$$

$$\text{where: tariff revenue} = c+d$$

$$\text{Cost of subsidy} =$$

$$a+b+c+d+e+f+g+h+i+j$$

$$NSG = -(b+j)$$

**18. The efficiency and welfare effects of an export subsidy for the U.S. grain sector**

The United States demand and supply for grains are:

$$D = 150 - 0.6 p,$$

$$S = -40 + 0.5 p,$$

where D and S are in millions tons and p in \$ per ton. The world price of grains is  $p^* = \$200$  per ton.

18.1. In a free trade situation, what would the U.S. production, consumption, and trade in grains be?

**Production:**  $S_1 = -40 + 0.5 (200) = 60$

**Consumption:**  $D_1 = 150 - 0.6 (200) = 30$

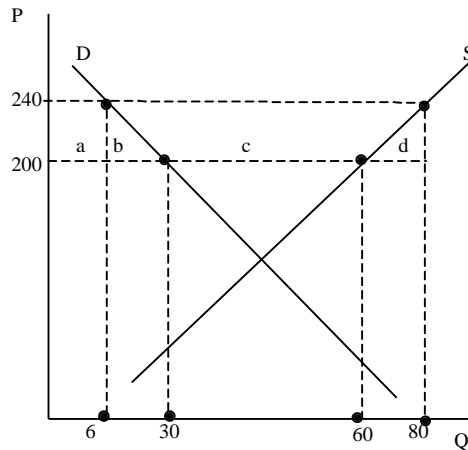
**Exports:**  $XS_1 = S_1 - D_1 = 30$

18.2. The farm lobby, arguing that the world price is artificially low because of European subsidy, is asking a 20% export subsidy for its grain. Assume that the U.S. is a “small country” in the world grain market.

Represent the welfare effect of this policy on a graph.

Calculate what would be:

- the domestic price of grains in the U.S.
- the effect on production, consumption and exports of grains.
- the welfare effect on consumers, producers, the cost to the government of the subsidy, and the overall welfare effect for the U.S.
- the efficiency losses in production and consumption. Why are they asymmetrical?



$$P^{US} = P^* (1+0.2) = (200)(1.2) = 240$$

$$S_2 = -40 + 0.5(240) = 80$$

$$D_2 = 150 - 0.6 (240) = 6$$

$$\text{Exports: } XS_2 = S_2 - D_2 = 74$$

$$\Delta CS = - (a+b) = -720$$

$$\Delta PS = a+b+c = 2,800$$

$$\Delta G = - (b+c+d) = -2960$$

$$NSG = - (b+d) = -880$$

$$\text{Production efficiency losses} = d = 400$$

$$\text{Consumption efficiency losses} = b = 480$$

Efficiency losses differ because the elasticities of supply and demand differ.

18.3. What if the U.S. was a large country in the grain market?

Consider now the international market. The net import demand curve for the rest of the world is:

$$MD = 50 - 0.1 p^*$$

With the 20% export subsidy given by the U.S., determine the new world market price and U.S. domestic price

Compute the welfare effects of the U.S. export subsidy on each of the following groups:

- U.S. grain producers
- U.S. consumers
- U.S. government budget
- The foreign countries

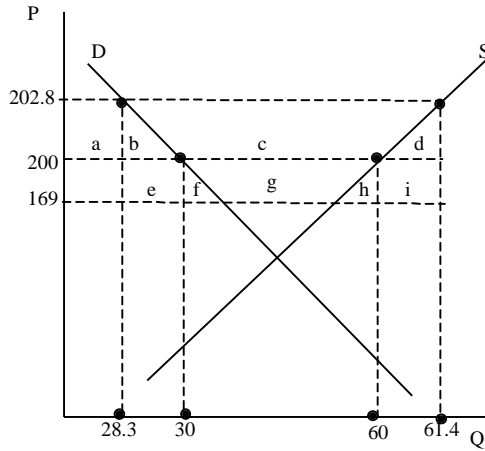
At  $P^* = 200$ :  $MD_1 = 50 - 0.1(200) = 30$   
 $XS_1 = S_1 - D_1 = -190 + 1.1P^* = -190 + 1.1(200) = 30$

With a 20% subsidy,  $MD_2 = XS_2$  results in ...

$$50 - 0.1P^{*2} = -190 + 1.1P^{*2}(1 + 0.2) \quad \Rightarrow P^{*2} = 169 \text{ and } P^{US,2} = 202.8$$

$$MD_2 = XS_2 = 33.1$$

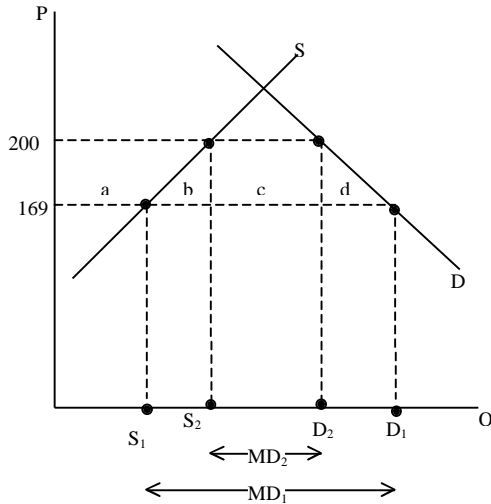
U.S. Market



With  $P^{US,2} = 202.8$   
 $Q_2 = 61.4, D_2 = 28.3$

Thus:  
 $\Delta CS = -(a+b) = -81.6$   
 $\Delta PS = a+b+c = 170$   
 $\Delta G = -(b+c+d+e+f+g+h+i) = -1,118.8$   
 $NSG = -(b+d+e+f+g+h+i) = -1030.4$

Foreign market



$\Delta CS = a+b+c+d$   
 $\Delta PS = -a$   
 $\Delta G = 0$   
 $NSG = b+c+d = (MD_2 + MD_1)(200-169)/2 = 978.05$

**19. Trade diversion by the creation of a free-trade area.**

In 1996 Chile joined Mercosur, a customs union that included Argentina, Brazil, Paraguay and Uruguay. We analyze the welfare effect of joining Mercosur for two specific commodities, meat and automobiles.

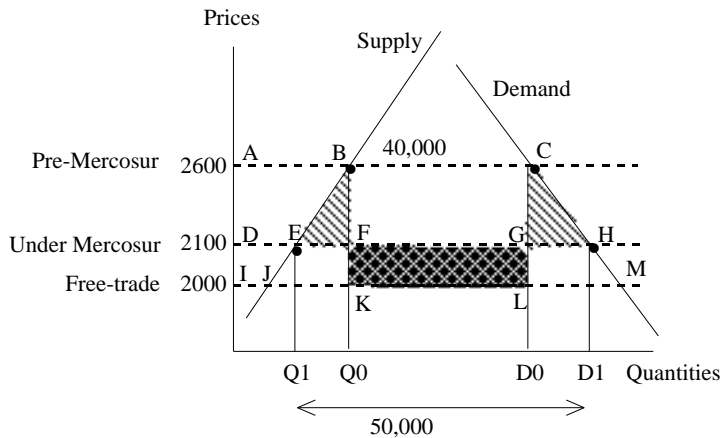
19.1. What is a customs union and how does it differ from a free-trade area like NAFTA?

**In a free trade area there is completely free trade among the countries of the area, but each country has its own trade policy with the rest of the world.**

**In a customs union, trade policy towards the rest of the world are harmonized, i.e., all countries apply the same tariff system.**

19.2. Prior to 1996, Chile was importing meat from the United States. The U.S. price of meat was \$2,000/ton and Chile was imposing a tariff of 30%. Imports were 40,000 tons. When Chile joined Mercosur, it could import meat from Argentina, free of import tariffs, at \$2,100/ton. Imports increased to 50,000 tons.

19.2.1. Represent on a graph the welfare effect for Chile of joining Mercosur.



19.2.2. Compute this welfare effect. Does Chile gain or lose in joining Mercosur? Why?

**Efficiency gains are  $BEF + CGH = \text{imports} * 500 / 2 = 10,000 * 500 / 2 = 2,500,000$**

**Terms of trade loss is  $FGLK = 40,000 * 100 = 4,000,000$**

**Chile will loose because it is importing from a country with higher costs, hence some terms of trade loss.**

19.2.3. By how much would imports have to increase in order for Chile to benefit from joining Mercosur?

**Need imports\*500 / 2 = 4,000,000, that is imports = 16,000.  
Only if imports increase to 16,000 would the efficiency gains compensate for the terms of trade loss.**

19.3. Consider now automobiles. Prior to 1996, with a 10% tariff from the Chilean government, Chile imported 125,000 automobiles from the U.S. at an international price of \$10,000 each (and therefore a higher domestic price). In joining Mercosur, Chile can either: (1) import automobiles from Brazil at \$12,000 each; or (2) import from the U.S. at \$10,000 *plus* the common external tariff of 24% that it is required to apply as a Mercosur member. What is the impact of joining Mercosur on the consumer price of automobiles in Chile? Does Chile gain or lose, and why?

**Prior to Mercosur:**

- consumer price is \$11,000
- government revenue is \$1,250,000

**After Mercosur, Chile can either import from Brazil at \$12,000 or from the U.S. at \$12,400.**

**Hence, consumers will buy Brazilian cars.**

- consumer price is \$12,000
- no government revenue

**Because the price of \$12,000 is further away from the opportunity cost of \$10,000, there are overall efficiency loss. And there is terms of trade loss as well.**

**Hence consumer loose, government loose, Chilean producers of automobiles gain, but there is overall loss.**