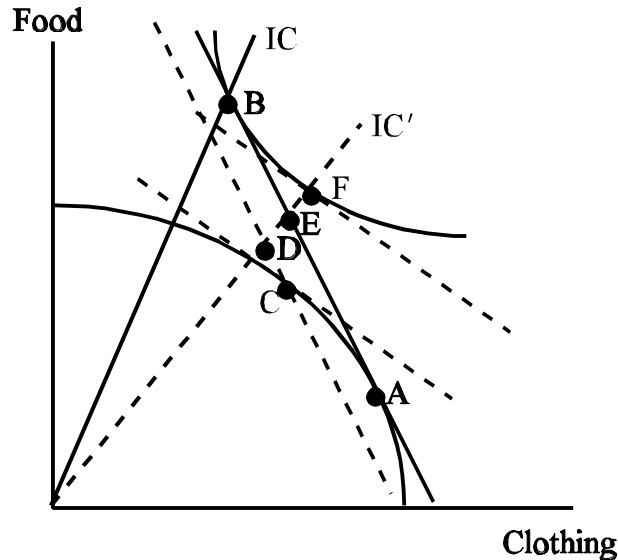


Homework #9: Answers

Text questions, Chapter 11, problems 1-3.

1. Use the kind of diagrammatic argument represented by Figure 11.3 for the case of production subsidies to present the case that a nation wishing to restrict consumption of some item below the free-trade level would do better to levy a consumption tax instead of a tariff.



Free trade equilibrium for this HOS economy involves production at A and consumption at B. Suppose that, through some legitimate political process, it is decided that society prefers to restrict the consumption of clothing, relative to that of food. Note that another way of saying this is that overall social welfare would be raised if clothing consumption fell relative to that of food. We leave aside the question of why, if “society” has these preferences, people prefer to consume the share represented by the IC-line through B. With this goal in mind, and supposing that the socially preferred ratio is given by IC', it is clear that a tariff, which induced production at C and consumption at D, would accomplish this goal. However, if this policy were pursued using a consumption tax-cum-subsidy, production equilibrium would still be determined by $MRT = p^*$ at A, with consumption at E. Given our usual assumptions about preferences, E will lie strictly in the interior of the preferred-to-D set. That is, since it contains strictly more of both goods, E will lie on a higher indifference curve than D. Unless the relative consumption goal is lexicographically preferred, there is an interesting question of whether the welfare difference between D and E is significant in the sense that, assuming that the difference between E and F (i.e. the free trade level of welfare—B and E lie on the same indifference curve) is smaller than the gain from achieving the consumption goal, if welfare fell to D society would (or would not) still prefer intervention to free trade.

2. Suppose that a capital-abundant HOS country levies a tariff on its labor-intensive imports.
- a. Show why this must improve the workers' real wage.

Abstracting from Metzler paradox considerations, this is just an application of the Stolper-Samuelson theorem.

- b. What further changes in the country's real wage would be brought about if foreign countries counter with tariffs of their own on Home exportables?

Retaliation by the Foreign country would, of course, further restrict trade and move the world price back toward its initial level. This, in turn, would undo (to some extent) the income distribution effects from the original policy, while the reduction in trade lowers total national income. Under conditions of a rational tariff war, that is a situation in which each country levies its Nash equilibrium tariff, it is possible for one country to gain. The other country must, of course, lose.

3. To expand upon section 11.4's discussion of the relationship between protection and foreign investment, suppose the Home country exports clothing, which is produced by labor and capital, and imports food, which is produced locally by labor and land (i.e. this is an RV economy). Let some of the capital used in the clothing sector be provided by Foreign investment. If the Home country protects its food industry with a tariff, trace through the following scenarios:

- a. What is the effect on factor prices, production, consumption, and trade?

Here, by reference to b, below, we are to take the Foreign-owned capital as fixed independently of policy. In addition, we recall that, in section 11.4, the Home country is taken to be economically small. From the 4-quadrant diagram, we know that the PPF has the conventional bowed-out shape. Thus, the effect of a tariff on production, consumption, and trade are conventional: production of import-competing food rises, while production of the exportable clothing falls; there is substitution of clothing for food along any indifference curve (i.e. the share of clothing, relative to food, in consumption rises); total consumption falls since the value of national income at world prices falls; and the value of imports and exports at, fixed, world prices also falls. The income distribution theorem for the Ricardo-Viner model, with land specific to the import-competing food sector, gives:

$$\hat{r}_T > \hat{P}_F = t > \hat{w} > \hat{P}_C = 0 > \hat{r}_K.$$

That is, the return to land rises in real terms, the return to capital falls in real terms, and the change in the real return to labor is ambiguous (rising relative to clothing, but falling relative to food).

- b. What is the further impact on factor prices, production, consumption, and trade if

returns to capital in the clothing sector adjust to a given world rate of return via changes in the quantity of capital foreigners wish to place in the protectionist country?

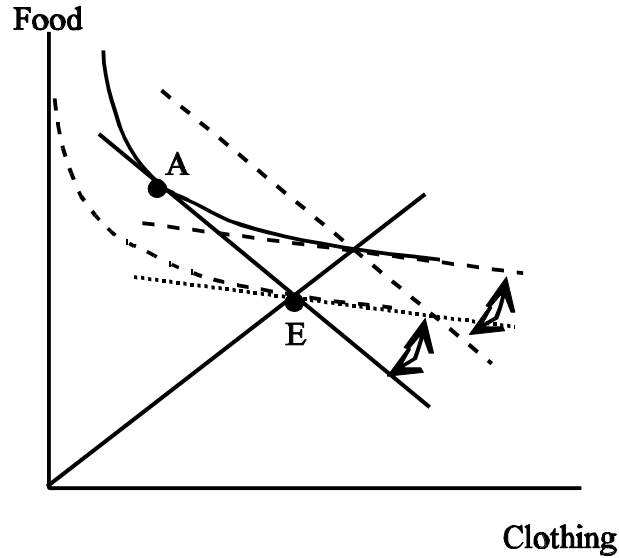
As we saw in the previous section, returns to capital (Foreign and domestic) are depressed by the tariff. This will cause capital to leave the Home country. Smallness means that the tariff-ridden Home price [i.e. $p = p^*(1 + t)$] is fixed. The reduction in the K available for production in this economy will result in a fall in clothing output and an increase in food output, and a fall in the value of domestic product at world prices. The fall in the value of domestic product means that domestic consumption of both goods will fall. [Though note that there is a tricky issue here: $r_K K_H^*$, i.e. the return to Foreign capital invested in the Home country, was not consumed at Home, or at least not by Home consumers. Furthermore, by moving, the Foreign capitalists ensure consumption at the pre-tariff level.] The value of trade will also fall [and note that this is a fall in addition to that generated by the tariff in the first place]. With reference to the labor market equilibrium diagram, it is easy to see that the return to land will rise and, recalling that the commodity prices are unchanged by Foreign capital leaving, the wage must fall in real (as well as nominal) terms. But then, by the weighted average property of price changes, this must mean that the return to the remaining capital must rise. More to the point, if r_K is equalized internationally by mobility, the return to K in the Home country will rise to the pre-tariff level.

c. What is the effect on net home welfare in each case?

The Home country is economically small and, so, cannot gain from a tariff. In the case of internationally immobile factors, the country loses unambiguously. The second case is more difficult. Relative to the free trade baseline, the country must lose. Unlike the Mundell case, in the RV model, both commodities will be produced in the second equilibrium. As a result, it must be the case that $MRS = MRT \neq p$. On the other hand, relative to the first equilibrium, it does not seem possible that we can make a definitive statement: labor loses unambiguously; but land and capital gain.

Workbook problems, 2, 3, 4, 6, and 8.

2. *The Prohibitive Tariff*: Point *E* is the endowment point and point *A* the free trade consumption point of a small open economy.



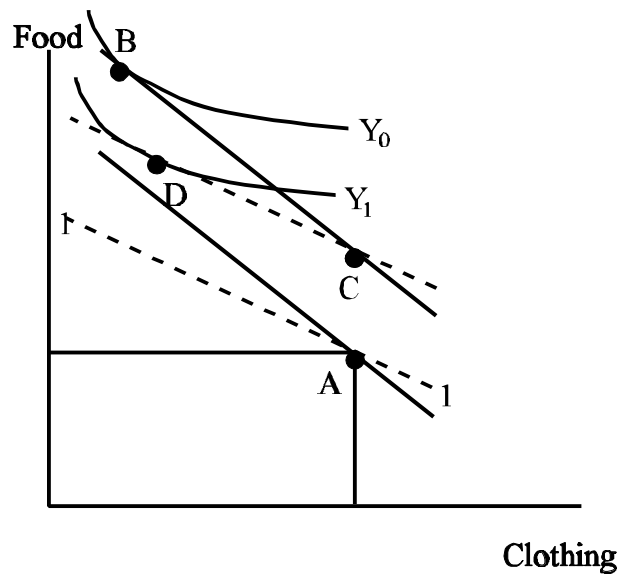
- a. Indicate the prohibitive tariff.

Assuming that preferences are homothetic, for graphical convenience, the prohibitive tariff is the tariff that produces the illustrated wedge between the world price and the price at which consumers prefer not to trade.

- b. Will an extremely large tariff on food, for example one that is larger than the prohibitive tariff, eliminate trade?

Such a tariff will, of course, eliminate trade. However, since trade is eliminated by the prohibitive tariff, there is no *additional* effect from this tariff.

3. *The Revenue-Maximizing Tariff when Production is Flexible*: For the small open economy illustrated below, 1-1 corresponds to the domestic price when the revenue-maximizing tariff has been levied if the country is an endowment economy.



- a. Is the revenue-maximizing tariff larger or smaller than this rate if it has a flexible technology?

Larger. The ability of the economy to adjust on the supply- as well as the demand-side means that the welfare costs are lower for any given tariff. This permits a higher revenue maximizing tariff.

- b. Is the optimal tariff larger than the revenue-maximizing tariff rate in either of these cases?

The optimal tariff for a small economy is zero (i.e. free trade is the welfare optimal policy for a small economy). Since the optimal revenue tariff is positive in both cases, it cannot be true that the optimal tariff is larger than the revenue maximizing tariff in either case.

4. *Ranking Policies:* In the following diagram, points A and B correspond to free trade production and consumption.

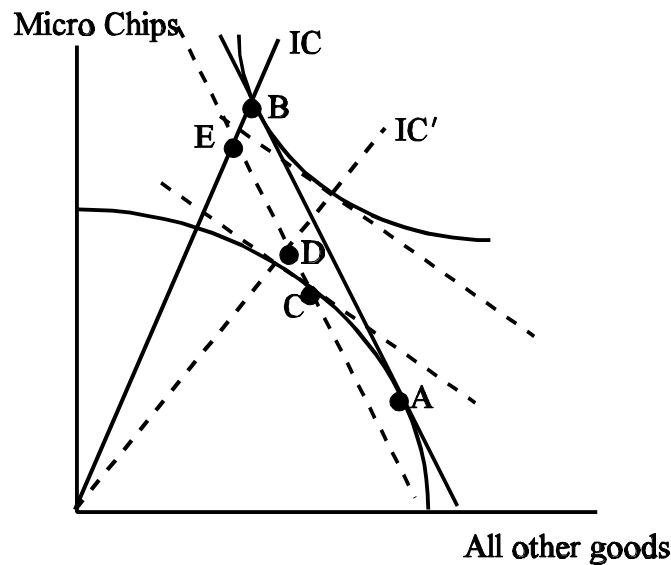
- a. Which production and consumption points would be realized if:
- i. an import tax were levied? **E**
 - ii. an export tax were levied? **E**
 - iii. a tax on the consumption of the import good were levied? **C**
 - iv. a subsidy to the domestic production of the import good were levied? **F**

- b. Rank these four policies from best to worst from the perspective of domestic consumers?

The authors are looking for an answer in terms of the diagram, where it is clear that free trade welfare (the indifference curve through B) > consumption tax (the indifference curve through C) > the production subsidy (the indifference curve through F) > the tariff (the indifference curve through E). However, since no policy objective is specified, this question actually has no answer at all.

6. Some analysts see the domestic production of computer chips as vital for US national security. To achieve this goal some have called for a tariff on imported chips, while others have called for a subsidy for American producers. A House Committee has asked you to testify on this issue.

- a. Which position will you take? (Use the following diagram to support your reasoning.)



The logic is similar to that in textbook question 1. In this case, a correct answer shows that the cost in economic welfare from the production subsidy which achieves the goal of production at C involves a lower welfare cost than the tariff which achieves the same production goal. This involves demonstrating that E lies in the interior of the better than D set. This result derives directly from the fact that a tariff is equivalent to a simultaneous production tax-cum-subsidy and a consumption tax-cum-subsidy, both of which involve welfare costs.

- b. How does the argument for protection in this scenario differ from the infant industry argument as originally formulated?

This is a non-economic argument. There is no assertion that this industry will eventually generate a flow of future benefits sufficient to offset the current costs of protection. The

claim here must be that the gains to security from having a domestic computer chip industry exceed the economic costs.

8. *The Infant Industry Argument and the Second-Best Nature of Tariffs*: The IMF has hired you into their Economists Program to assess the performance of a number of developing nations. One of these countries has a large tariff on the imports of tractors. In a letter to their Minister of Finance you point out that the tariff raises very little revenue and you advise that it be removed. You receive a short note from the Minister's economic advisor stating that they would like to oblige, but that they consider domestic production of tractors of utmost importance. The note reads: "The tractor industry is currently in its infancy, but one day it will become an important source of foreign exchange earnings".

a. What will you reply to this argument?

The first question to ask is the source of market failure causing private investors to miss the opportunity to invest in a positive net present value project.

b. In response to the point you made in part a), the Minister's advisor informs you that the tractor industry receives protection because it provides useful training for many young workers who later return to their villages as skilled mechanics. The owner of the factory claims that if trade were unrestricted he would have to close the plant and an important educational activity would be lost. How do you respond to this letter?

If the flow of mechanics to the country-side is sufficiently valuable to support trade intervention for a finite period as a welfare maximizing policy, you can point out that a direct subsidy to production would accomplish exactly the same goal, but would not result in the consumption loss from the tariff. It is also possibly the case that an even less expensive expedient would be to set up a school for mechanics (this could even be done by buying the factory from its current owners).

c. The Minister's advisor does not give up. He calls your office and explains that unless the returns to domestic investors in the tractor factory remain high no further investments will flow its way. This factory is considered an important model for future factories in the country, so the social return from its operation exceed the private return earned by the investors. You have sympathy for their desire to keep the factory open, but you do not surrender. What is your counter argument?

This argument suggests that the second proposal, because the school *would* result in shutting down the factory as a going commercial concern, is undermined by this argument. However, it does not respond to your first proposal. The first (i.e. the production subsidy) ensures exactly the same level of profitability, but does not entail an additional consumption cost.