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FACTOR MARKET DISTORTIONS AND
THE THEORY OF TRADE GAINS

by

Raveendra Batra

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I

Under the 'standard' assumptions of Pareto optimality, it is possible to show that free trade is necessarily superior to no trade or protection in the sense that the level of social welfare attained by a country will be higher under free trade than under protection.¹ Given the absence of natural monopoly power in trade, free trade results in optimal allocation of world resources and hence maximum national and international welfare. The assumptions necessary to reach this welfare peak are perfect competition in product and factor markets with perfect factor-price flexibility and internal mobility of factors, constant returns to scale, inelastic factor supplies and full employment of factors which is, of course, assured by perfect mobility and factor-price flexibility. In a two-commodity, two-factor model, the superiority of free trade over protection can be demonstrated graphically, and because the results derived in this manner lend themselves to easy comprehension, the model that has carried favor

*I am grateful to Drs. Haitani and Wells for their comments on an earlier draft. Pattanaik provided useful insights.

¹See, for example, P. A. Samuelson, "The Gains from International Trade," Canadian Journal of Economics and Political Science, May 1939, pp. 195-205, and Murray Kemp, "The Gain from International Trade," Economic Journal, December 1962, pp. 803-19.

with trade theorists has been usually of the two-by-two form.²

Recent years, however, have witnessed a revival of interest in the economic arguments for protection mainly because the economist's attention has been drawn to the unending problems of developing countries. In a classic paper, Haberler has shown that under conditions of factor-price rigidity, with or without factor immobility, protection may be superior to free trade.³ Little more has been added since then, except that Johnson⁴, in a taxonomical exercise, has recently introduced certain refinements into Haberler's results.⁵ The method of analysis followed by Haberler as well as Johnson is to start from a position of no trade, introduce free trade, and then compare the level of social welfare attained in these two situations. In actual practice, however, the need for protection arises when the country under consideration, following a policy of free trade, considers it detrimental for its welfare. That Johnson himself is aware of this will be clear from the following passage:

²See, for example, R. E. Baldwin, "The New Welfare Economics and Gains in International Trade," Quarterly Journal of Economics, February 1952, pp. 91-101.

³G. Haberler, "Some Problems in the Pure Theory of International Trade," Economic Journal, June 1950, 223-40.

⁴H. G. Johnson, "Optimal Intervention in the Presence of Domestic Distortions," in Trade Growth and the Balance of Payments (Rand McNally & Company: Chicago, 1965), Ch. 1.

⁵To be sure Hagen, "An Economic Justification of Protectionism," Quarterly Journal of Economics, November 1958, pp. 496-514, and Bhagwati and Ramaswami, "Domestic Distortions, Tariffs and the Theory of Optimum Subsidy," Journal of Political Economy, February 1963, pp. 44-50, explored the consequences of factor market distortions for the relative merits of free trade and protection, but their analyses are fundamentally different from Haberler's in that the distortions in their models arise from inter-industry differentials in factor prices and not from immobility of factors and the rigidity of factor prices. Batra and Pattanaik, "Domestic Distortions and the Gains from Trade," Economic Journal (forthcoming), have recently extended their results to many other theorems.

For the analysis of arguments for protection derived from immobility of factors and downward rigidity of factor prices, it is convenient to pose the problem in terms of whether the opening of the opportunity to trade makes a country worse off when these conditions exist, so that a prohibitive tariff would secure a higher level of welfare than could be attained under free trade, even though in reality the argument for protection usually arises when trade is already established and the international price of imports suddenly falls.⁶

Johnson further asserts that "the difference of assumptions merely simplifies the problem without altering the conclusions."⁷ One of the purposes of this paper is to show that "the difference of assumptions" does alter the conclusions. Specifically, it will be shown that free trade is necessarily superior to no trade even in the presence of inflexible factor prices, provided we start from a situation of free trade and then introduce a prohibitive tariff.

The hypothesis that protection, in the presence of inflexible factor prices, may be superior to free trade rests on the possibility of large scale unemployment of factors specific to and engaged in the production of the importable good as a result of the fall in the relative price of importables consequent upon the introduction of trade. This is, of course, moving from no trade to free trade. Both Haberler and Johnson here assume full employment of factors in the absence of trade in spite of inflexibility of factor prices, and unemployment of a fraction of given factor supplies

⁶Ibid., p. 14 (Italics mine.)

⁷Ibid., p. 14 (Italics mine.)

is caused only by trade. But why should not the rigidity of factor prices result in some unemployment even in the absence of trade?⁸ Likewise, there could be some unemployment even in the initial situation of free trade. Another purpose of this paper then is to extend Haberler's analysis to the case where there is already some unemployment in the initial situation of either no trade or free trade.

II

For the sake of simplicity, it is assumed that factors are perfectly immobile and their prices perfectly rigid. As Haberler has shown, the results derived under these extreme assumptions are not disrupted where factors have some degree of mobility and price flexibility. Consider Fig. 1 where OCE is the transformation curve of the country under analysis; DS indicates the domestic-price ratio in the absence of trade which results in the country producing and consuming at point S, with its factors of

⁸Johnson at least is aware of this point but he ignores its implications by asserting that "full employment can always be secured by devaluation coupled with an appropriate domestic fiscal-monetary policy." *Ibid.*, f. n. 12, p. 15. But the possibility of unemployment due to factor-price rigidity cannot be dismissed so lightly. Keynes has so effectively proved this to the world. Currently, Britain's frustrating experience with devaluation serves as an excellent example of how an advanced country may be unable either to restore equilibrium in its balance of payments or ease domestic situation of unemployment in the presence of a rigid wage structure imposed by powerful trade unions. It may not then be possible to attain full employment through "devaluation coupled with an appropriate domestic fiscal-monetary policy," thanks to the power of trade unions.

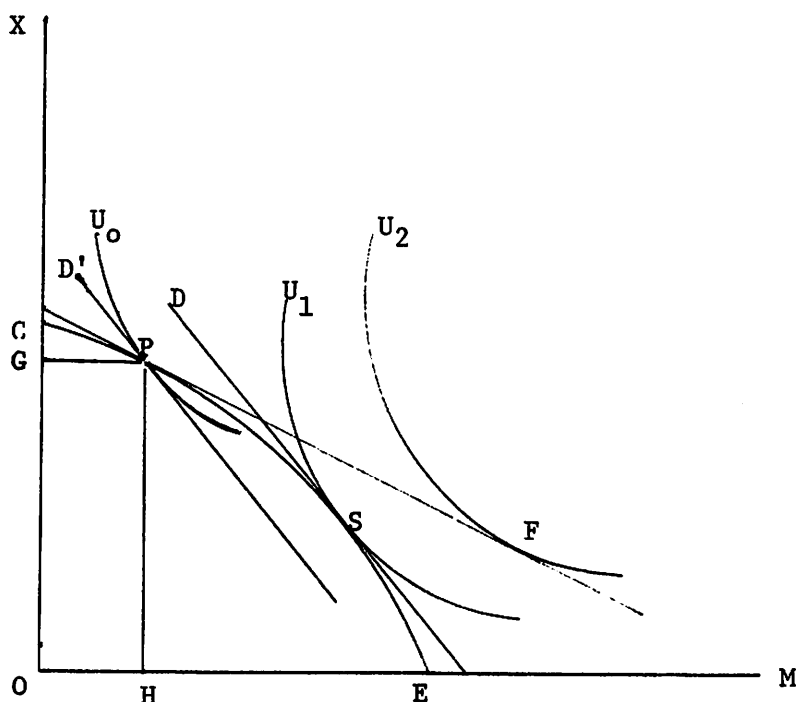


Fig. 2

from U_0 to U_1 , with production and consumption finally resting at S. In this case the movement from U_2 to U_0 is a consumption loss, whereas that from U_0 to U_1 is again the production gain. In both cases, however, free trade is superior to no trade.

Now suppose that factors of production are perfectly immobile, but factor prices are still flexible. In terms of fig. 1, the transformation curve is given by the rectangle OASB, reflecting the fact that the output of X and M is fixed as no factor can move from one industry to another. The introduction of trade at the international-price ratio P'T (parallel to PF) leads to the consumption point at T, with the production point still remaining at S, because (1) factors, by assumption, cannot move from M to X, and (2) full employment is maintained because of perfectly flexible factor prices. However, free trade is still superior to no trade

Assume now that factor immobility is accompanied by perfect factor-price rigidity.

(A). From No Trade to Free Trade

Consider fig. 3 which is drawn on the pattern of fig. 1; DS is again the domestic-price ratio in the absence of trade, with S being the point of self-sufficiency equilibrium, and U_1 , the level of welfare. If factors are completely immobile, but factor prices are flexible, free trade, as before, leads to a higher level of welfare U_2 . However, if factor prices are also rigid, there will be unemployment of some factors employed in M as a result of the fall in its relative price consequent upon the introduction of free trade. As a consequence, the output of M will decline, although that of X will remain the same as unemployed factors cannot move from M to X. In other words, consumption gain, in this case, will be accompanied by production loss. The new production point will lie anywhere on AS, but to the left of S. Draw P'F' parallel to PF, such that P'F' touches U_1 at F'. If the new production point is given by Q, it is still possible to reach the level of welfare given by U_1 . Here the consumption gain is exactly offset by the production loss. Both free trade and no trade in this case lead to the same level of welfare. If the production point lies between Q and S, free trade will make the country better off than no trade; if between A and Q, free trade will make the country worse off than no trade. The figure depicts this last possibility, with free trade leading the production point to P'' and the consumption point to F'' and the level of welfare to U_0 . Thus a movement from no trade to free trade may prove detrimental to the welfare of a country, provided the

consumption gain falls short of the production loss. It is this possibility which is suggested by Haberler and later on by Johnson.

(B.) From Free Trade to No Trade

Consider fig. 4 which is drawn on the pattern of fig. 2, with OGPH being the rectangular transformation curve. Under free trade the country produces at P and consumes at F, with its level of welfare given by U_2 . A prohibitive tariff unaccompanied by factor-price rigidity, leads to production and consumption at P and to the level of welfare given by U_1 . If factor prices are also rigid, the production of X will decline as a result of the fall in its relative price from PF to DP, whereas the production

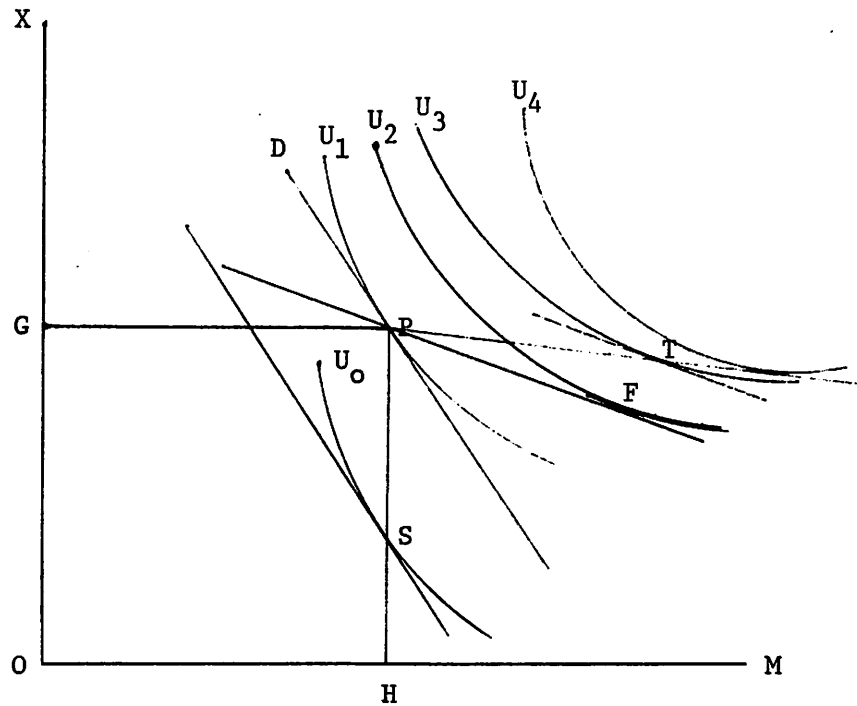


Fig. 4

of M will remain the same as no factor can move from X to M. This case

is then just the reverse of the one discussed above. Suppose the new production point is given by S. This will also be the consumption point, so that the level of welfare will be given by U_0 . The movement from U_2 to U_1 is the consumption loss, and that from U_1 to U_0 is the production loss. Free trade in this case is necessarily superior to no trade, in spite of rigidity of factor prices. Where the need for protection arises "when trade is already established and the international price of imports suddenly falls," the case that Johnson suggests in the passage quoted above, the analysis is slightly different. Suppose that the international relative price of imports suddenly declines from PF to PT (see fig. 4), so that, given the assumed rigidity of factor prices combined with factor immobility, industry M faces extinction and large scale unemployment of the factors employed by it, thereby creating the possibility of free trade making the country worse off than no trade - a possibility arising due to similar reasons in fig. 3. However, even here, a prohibitive tariff, which leads eventually to U_0 , is not the correct solution. Rather, a non-prohibitive tariff, which raises the domestic relative price of importables to that given by PF, that is, $PF = PT (1+t)$, where t is the rate of tariff, will not only restore the original point of production (P), but also lead to a level of welfare U_3 higher than even U_2 , the level of welfare prevailing before the sudden decline in the international relative price of imports. Thus the solution to the problem of potential unemployment that may arise in the presence of free trade is a non-prohibitive, rather than a prohibitive, tariff, which runs contrary to what is suggested by either of Haberler or Johnson.

However, the level of welfare is sub-optimal even with this non-prohibitive tariff. A lump-sum tax on X producers and the equivalent

production subsidy to M producers, such that the commodity-price ratio to the producers returns to the old level of PF, will in combination with free trade lead to the optimum level of welfare given by U_4 . It is important that the tax on the X producers be a lump-sum tax, rather than a production tax, because (1) the objective is not to lower the output of X since factors released from X will not be absorbed by M, and (2) a production tax on X will not yield anything if its output is to remain unchanged.

III

The analysis so far has been conducted under the assumption of full employment of factors in the initial situation as can be seen from the fact that the production point in initial situations was lying on the transformation curve. For example, point S in fig. 3 corresponds to point S in fig. 1, which lies on the transformation curve; similarly point P in fig. 4 corresponds to point P in fig. 2, which also lies on the transformation curve. However, it is quite possible that due to the inflexibility of factor prices, some amount of factors is unemployed even in the initial situation, in which case the production point will lie somewhere inside the transformation curve. It may be noticed here that this situation is different from the one postulated by Haberler or Johnson who begins with a situation of full employment of factors in the initial situation of no trade, and then proceed to introduce free trade which, as a result of inflexibility of factor prices, in turn causes some unemployment of factors engaged in the production of the importable commodity. However, the possibility of unemployment in the initial situation of no trade cannot be ruled out at least in developing countries or such advanced countries as

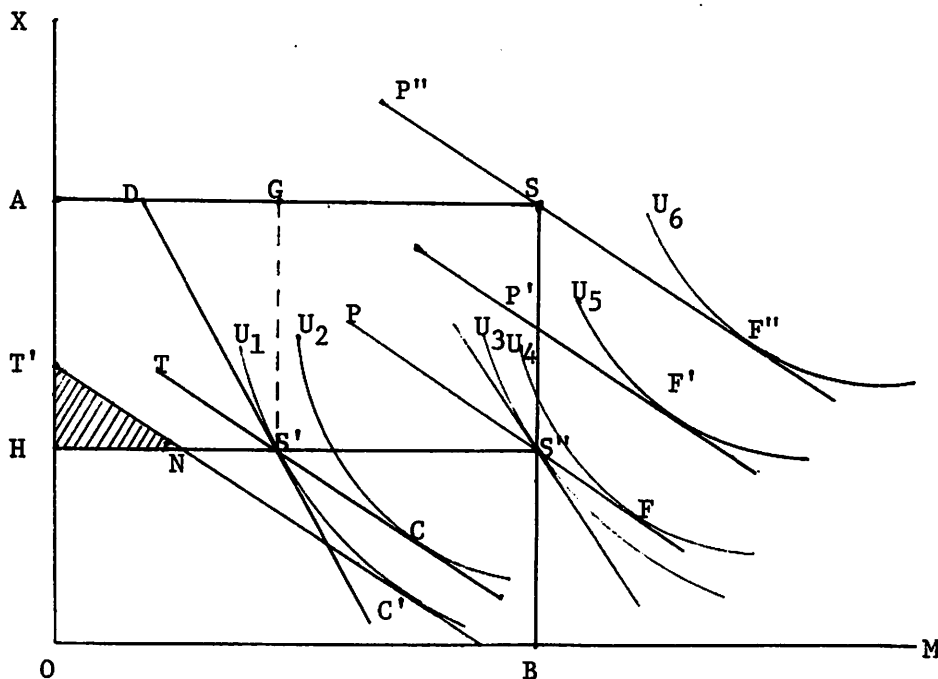


Fig. 5

are passing through the trauma of recession.¹⁰ Under such conditions, the analysis of gains from trade will be different from that given by Haberler. Suppose again for simplicity that factors are still perfectly immobile between the two industries, that is, the transformation curve is still a rectangle even though the production point lies inside it.

(A.) From No Trade to Free Trade

Consider fig. 5 where OASB is the rectangular transformation curve of fig. 3, and S is the production point corresponding to full employment.

¹⁰Jagdish Bhagwati, "The Development of Trade Theory in the Context of Underdeveloped Countries," in A. K. Das Gupta (editor), Trade Theory and Commercial Policy in Relation to Underdeveloped Countries (Asia Publishing House: New York, 1965), Ch.1, has explored the consequences of the introduction of trade when there is already unemployment in a 'labor-surplus' economy. However, his analysis is different from the one attempted here.

Assume, for the time being, that factors involved in the production of M have flexible prices, and those involved in the production of X alone have rigid prices. Under these conditions, factors specific to M will be fully employed, with M being at the point of maximum production, whereas some amount of factors specific to X will remain unemployed, with the output of X being less than its full-employment level. Suppose then the actual production point is given by S'' , which is also the consumption point under self-sufficiency, with the level of welfare being given by U_3 . With the introduction of free trade at the international-price ratio, PF (parallel to $P''F''$ and $P'f'$), the country produces at S, consumes at F'' , and its level of welfare improves to U_6 . The total gain from trade can be, as before, divided into two components: the increase in welfare from U_3 to U_4 is the consumption gain, and that from U_4 to U_6 is the production gain. Here free trade is necessarily superior to no trade.

The reason for the improvement in welfare from U_4 to U_6 lies in the fact that, because of the presence of unemployed factors specific to X, the output of X rises at the international-price ratio PF, showing a higher relative price of X than that under no trade, whereas the output of M does not decline, even though its relative price falls, because of the flexibility of prices of the factors employed by it. If the output of X does not rise to its full employment level given by point S, but rises only to, say, P' , the country's level of welfare will be given by U_5 . Free trade will still be necessarily superior to no trade, though the level of welfare will be sub-optimal. In this case, a subsidy to the production of X can take the production point to S and with free trade to the optimum level of welfare given by U_6 .

This, of course, is possible only if factors engaged in the production of M have flexible prices. If factors have rigid prices in both X and M, there will be some unemployment of factors in both industries. The actual production point will then be given by any point such as S' . In this case, the level of welfare under self-sufficiency is given by U_1 . The consumption gain resulting from the introduction of trade leads to a higher level of welfare given by U_2 , with the production point still remaining at S' . Now at the international-price ratio, TC , the output of X will rise (which it can because of the existence of unutilized factors specific to it) and the output of M will decline (because of the rigidity of factor prices), so that the new production point will lie somewhere inside the rectangle $AHS'G$. Draw $T'C'$ parallel to TC such that it touches U_1 at C' . If the new production point lies on $T'N$, it is possible to reach the level of welfare given by U_1 . If the new production point lies inside the shaded triangle $T'HN$, free trade will make the country worse off than no trade; if it lies anywhere inside the area $AT'NS'G$, free trade will be superior to no trade.

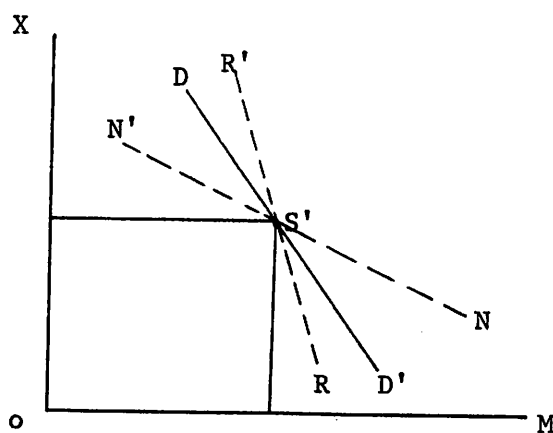


Fig. 6

It is clear, therefore, that whether free trade is superior or inferior to no trade depends upon the size of the production effect resulting from the switch from the no-trade price ratio to the international-price ratio. Now the production effect may be biased towards the output of the exportable commodity or the importable one, or it may be neutral between them. If the ratio between the rise in the output of X and the fall in the output of M ($-\Delta X/\Delta M$) equals the no-trade price ratio, i.e., if

$$\left| \frac{\Delta X}{\Delta M} \right| = \frac{P_m}{P_x}_T$$

where P_i ($i = x, m$) denotes the price of the i th commodity, and T , the prohibitive tariff, the production effect will be considered to be neutral; the production effect will be considered to be 'export-oriented' if

$$\left| \frac{\Delta X}{\Delta M} \right| > \frac{P_m}{P_x}_T$$

and 'import-oriented' if

$$\left| \frac{\Delta X}{\Delta M} \right| < \frac{P_m}{P_x}_T$$

In terms of fig. 6, the production-effect will be neutral, export-oriented, or import-oriented, depending on whether the ratio between changes in the two outputs follow the path given by DD' (where the slope of DD' equals the commodity-price ratio $(P_m/P_x)_T$ under no trade), any line such as RR' or NN' .¹¹ Note that the figure depicts the production-effect for both cases; the one in which the output of X rises and that of M falls, and the other in which the output of X falls and that of M rises. The latter case will facilitate our exposition in part (B) of this section.

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The precise location of the new production point will, of course, depend on the steepness of the marginal cost curves pertinent to both commodities, or, what is the same thing, on the extent of diminishing returns in the two industries.

Let us now go back to fig. 5 and consider the case where the production point in the absence of trade is given by S' . If the production-effect is neutral or export-oriented, the new production point will lie on DS' or somewhere inside the triangle DGS' . In both cases, free trade will be necessarily superior to no trade, because free trade, it may be remembered, can be inferior to no trade only if the new production point lies inside the shaded triangle. If the production-effect is import-oriented, the new production point will lie inside the area $HADS'$. Here it is possible, though not necessary, for free trade to be inferior to protection. Thus, a necessary, though not sufficient, condition for free trade to be inferior to no trade is that the production-effect be import-oriented.

(B). From Free Trade to No Trade

So far we have followed Haberler's and Johnson's method of moving from no trade to free trade and shown that if some amount of factors is already unemployed, free trade may make the country worse off than no trade only if the production-effect is import-oriented. It will now be shown that this result is valid even when the country switches back from free trade to protection.

oriented, the new production point will lie on P'D' or inside the triangle HP'D'. In both cases, free trade will be superior to no trade. However, if the production-effect is import-oriented, the new production point will lie inside the area P'D'SL. Here again arises the possibility for free trade to be inferior to no trade. Thus, as before, the necessary, but not sufficient, condition for free trade to be inferior to protection is that the production-effect be import-oriented. For example, if the new production point is given by T, then U_3 , the level of welfare at that point, is higher than U_2 , the level of welfare under free trade.

IV. Concluding Remarks

The foregoing discussion shows that Haberler's thesis that protection may be superior to no trade if factor prices are rigid, holds only if the country under consideration switches from a policy of prohibitive tariff to that of free trade; if free trade is already established and the country switches to the policy of protection, free trade is necessarily superior to no trade in spite of rigidity of factor prices. In both cases, full employment of factors is assumed in the initial situation. In general, the need for protection to an industry arises when the country is already following the policy of free trade, and the domestic industry cannot exist due to foreign competition. One could, however, envision circumstances where a country would like to move from protection to free trade. This possibility may arise if the country, having protected an 'infant' industry some years ago, now feels confident about its competitiveness and decides to remove the tariff.

If there is already some unemployment, the switch from protection to free trade is necessarily beneficial if factors engaged in the production of the importable commodity have flexible prices, and even if they have rigid prices, free trade is still beneficial if its production effect is either neutral or export-oriented. The same is true in the case of a movement from free trade towards protection. However, if the production-effect of the policy switch--from no trade to free trade or the reverse--is import-oriented, free trade may become inferior to protection in both cases.