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A THEORETICAL ANALYSIS OF SMUGGLING\*

Jagdish Bhagwati and Bent Hansen

Number 75

July 1971

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In some underdeveloped countries smuggling takes on large proportions and is a major economic problem. In Afghanistan as much as one quarter to one fifth of total foreign trade is believed to be smuggling trade (Hansen, 1971; Smith et.al., 1969). Other countries in the East, certainly Indonesia, and a number of African countries also have this problem. There is a need, therefore, to look at smuggling not only as a moral and legal problem but also as a purely economic phenomenon.

It is commonly argued that smuggling must improve economic welfare since it constitutes (partial or total) evasion of the tariffs (or quantitative restrictions) which, for a small country, would signify a sub-optimal policy. We propose to demonstrate in Section I of this paper the falsity of this view, while also investigating the restrictive conditions under which smuggling may improve welfare.

Since, however, the tariff may be, and often is, levied to achieve specific objectives such as protecting import-competing production or collecting revenue, we should also want to compare the welfare levels reached under tariffs with and without smuggling, subject to such exogenously specified objectives. In Section II, we do this for the case of protecting production and show that the achievement of a given degree of protection to domestic importable production, in the presence of smuggling, produces lower welfare than if smuggling were absent. In Section III, we extend our analysis to the phenomenon of faked invoices. In a sequel to this paper, we extend our analysis of smuggling to other areas of international economics as also to the problem of domestic taxation.

## I. Smuggling and Welfare

In the following analysis, we apply the Hicks-Samuelson value-theoretic framework which is customarily used in the traditional theory of international trade: primary factors, in perfect competition, produce (two) traded goods. We further assume that the country is small--i.e., the terms of trade are fixed. We shall assume a given, well-behaved community indifference map. This assumption could be given up without altering any conclusions: it is retained only for convenience of exposition.

Since smuggling merely represents, from a welfare point of view, yet another way in which exportables are transformed into importables, we must represent it as a smuggling transformation (or offer) curve. However, it is clear that this transformation curve must be less favorable than the terms of trade.

We next have the option of assuming that smuggling is either competitive or monopolistic and that the smuggling offer curve is characterized by either a constant rate of transformation or an increasing rate of transformation. We consider all these options in the following analysis.<sup>1</sup> For the sake of simplicity we shall assume that the individual smuggler has a constant marginal rate of transformation. When we assume increasing marginal rates of transformation for the smuggling industry as a whole, we retain the assumption of individual constant rates of transformation. The industry's increasing rate of transformation is thus exclusively due to intra-industrial, inter-firm diseconomies of scale. This assumption permits us in a simple way to deal with both perfect competition and monopoly without loss of generality.

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<sup>1</sup>We disregard the petty smuggling of tourists which is done at zero marginal costs (economically). Our concern is large-scale smuggling on a commercial basis.

With perfect competition in smuggling, both the foreign price (the terms of trade) and the domestic price are given to the individual smuggler. With monopoly in smuggling, however, several possibilities are open. We shall use a minimum assumption to the effect that whereas the monopolistic smuggler knows and takes into account the form of the (smuggling) industry's transformation curve, he does not consider the effect on domestic prices of a change in the volume of smuggling.<sup>2</sup> We have in fact also studied the case in which the monopolistic smuggler does consider domestic price effects. But our conclusions remain valid in this case as well. Hence, for reasons of space, we do not present this analysis here. Moreover, we cannot possibly take up here all possible cases of imperfect competition.

We also assume that, in the monopolistic smuggling case, the smuggler is a "non-resident" whose profits therefore do not constitute welfare for the country which experiences smuggling. The question of the residence of the smuggler clearly does not arise, however, in the case of competitive smuggling; for, under our assumptions, the smuggling profits under competition would be zero.<sup>4</sup>

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<sup>2</sup>At constant costs our monopolistic smuggler clearly behaves in exactly the same way as a competitive smuggling industry would do. And at increasing costs he behaves as a competitive smuggling industry does at increasing costs for the individual smuggler without intra-industry diseconomies.

<sup>3</sup>We could assume that the smuggler is a resident of the country or, which is very realistic in some primitive countries where smuggling is a large industry, that the smugglers really belong to no country. In Afghanistan nomadic tribes move across the borders to and from Pakistan and Iran and some of them make a living from smuggling (Smith *et.al.*, 1969, p. 328ff.). They are "countries without fixed territory." Either country, or both, may include the nomads in their population and national income estimates, but such statistical conventions do not integrate the nomads with either country!

<sup>4</sup>We should clarify, however, that the theorems for the monopolistic-smuggling case, showing that smuggling may be harmful, do not critically depend on the assumption that the smuggler is a non-resident. While it may be thought that the country must be worse off from the exercise of monopoly power from abroad, it must be remembered at the same time that the monopolist smuggler maximises along an "inferior" transformation curve and not along the "legal" offer curve.

↙ ↘

Perfect Competition in Smuggling at Constant Costs

In Figure 1, AB is the production possibility curve and the slope of  $P_f C_f$  (= the slope of  $P_t C_t$ ) is the fixed, international terms of trade. The domestic price, inclusive of the tariff but in the absence of smuggling, is tangent to AB at  $P_t$ . If free trade prevailed, welfare would be at  $U_f$ , whereas with the tariff, but without smuggling, it would be at  $U_t$ .

With smuggling, however, the smuggling transformation curve is  $P_s C_s$  (steeper than  $P_f C_f$ , but less steep than the tangent at  $P_t$ ) the domestic price faced by producers and consumers is  $P_s C_s$ , and the welfare is  $U_s$ .

Since  $U_s < U_t$ , we have here a case where smuggling has reduced welfare below what it would be in the absence of smuggling. Smuggling becomes a welfare-reducing phenomenon, contrary to common belief.

On the other hand, Figure 2 depicts a case where  $U_s > U_t$ : smuggling has improved welfare. We can therefore state the following theorem:

Theorem I: For non-prohibitive tariffs, and constant costs smaller than the tariff-included price and perfect competition in smuggling, smuggling cannot be uniquely welfare-ranked vis-à-vis non-smuggling.

The rationale underlying this theorem is readily seen by analogy with the analysis of the welfare-effects of a trade-diverting customs union. Smuggling is analogous to admitting a "partner country" as an importer at higher cost than the "outside country;" smuggling therefore imposes a terms-of-trade loss, but the production and consumption gain may outweigh this loss, as they do in Figure 2, but not in Figure 1. Thus, we cannot tell in general whether smuggling is welfare-improving or not--compared to legal trade with the tariff.

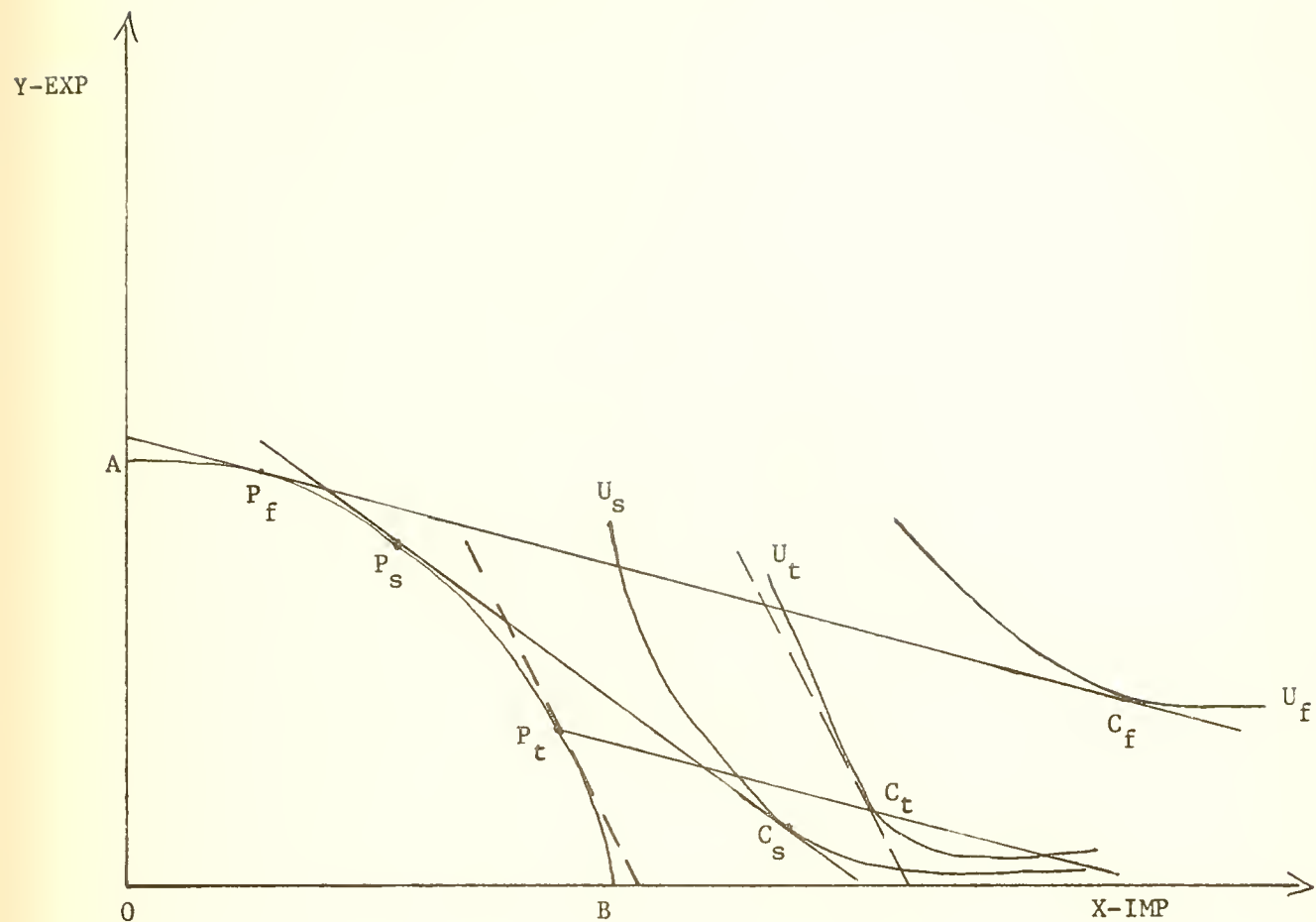


Figure (1)\*

Perfect Competition in Smuggling at Constant Costs

\* With free trade, production possibility curve AB, and given international price-line  $P_f C_f$ , the welfare (maximum) is at  $U_f$ . With tariff, the production, consumption and welfare are at  $P_t$ ,  $C_t$ , and  $U_t$  respectively, provided that no smuggling takes place. With smuggling, at constant price-line (transformation line)  $P_s C_s$ , less steep than the tangent to AB at  $P_t$ , legal trade ceases and welfare ends up at  $U_s < U_t$ . Hence, smuggling reduces welfare.

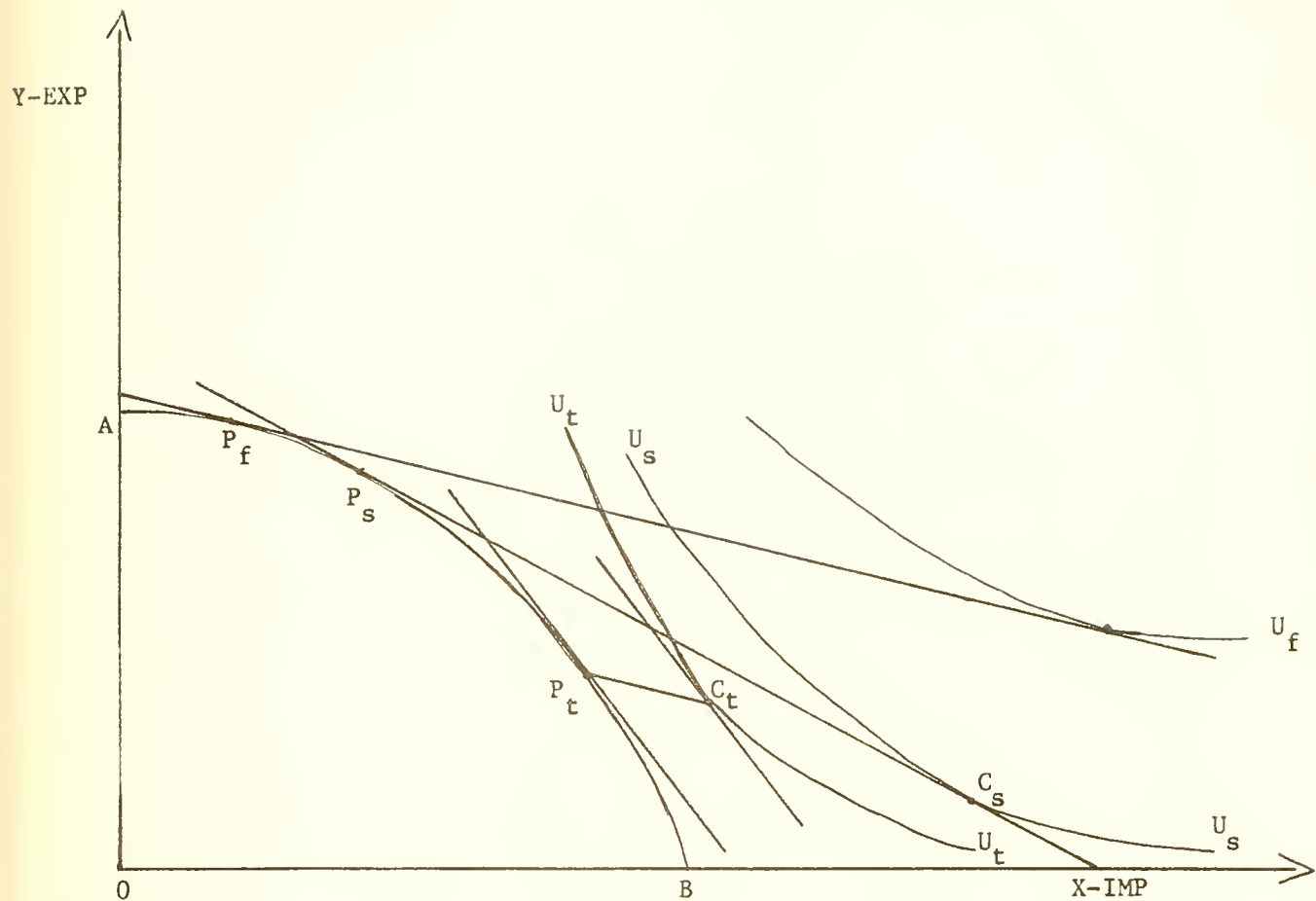


Figure (2)\*

Perfect Competition in Smuggling at Constant Costs (cont.)

\* This figure is identical with Figure 1, except that now smuggling improves welfare:  $U_s > U_t$ . With the smugglers' transformation line less steep than the tangent at  $P_t$ , legal trade is again eliminated.

In both Figures 1 and 2 legal trade is eliminated, given the assumption that the smugglers' transformation line is less steep than the tangent to the country's production frontier at  $P_t$ ; when the competitive smugglers' costs are constant and lower than the tariff-included price, legal trade cannot survive. Were the smugglers' transformation line steeper than the tangent at  $P_t$ , smuggling would on the other hand cease completely and legal trade prevail. But there is here a borderline case in which smuggling and legal trade may coexist. When the smugglers' transformation line coincides with the tangent at  $P_t$ , smugglers' constant costs are equal to the tariff-included price and smuggling may or may not prevail. Unfortunately our assumptions leave, strictly speaking, the division of trade between smuggling and legal trade indeterminate. Nevertheless, we can state unequivocally that in this case smuggling must be a welfare-reducing activity. Figure 3 shows that no matter how much or little smugglers trade, trade exclusively on a legal basis would be better. If the smugglers have all trade, as at point  $C_s$  at welfare level  $U_s$ ,  $C_t$  at the welfare level  $U_t$  must clearly be better:  $U_t > U_s$ . And with smuggling at  $Q$  and legal trade at  $C_{s,t}$  we have  $U_t > U_{s,t}$ . We have thus the following theorem:

Theorem II: For non-prohibitive tariffs, and constant costs equal to the tariff-included price and perfect competition in smuggling, legal trade and smuggling may coexist. In this case, no smuggling is better than any amount of smuggling; and the less smuggling, the better.

#### Perfect Competition in Smuggling at Increasing Costs

We now consider the case where there are increasing costs in smuggling while it continues to be competitive. It is clear that, in this case, we

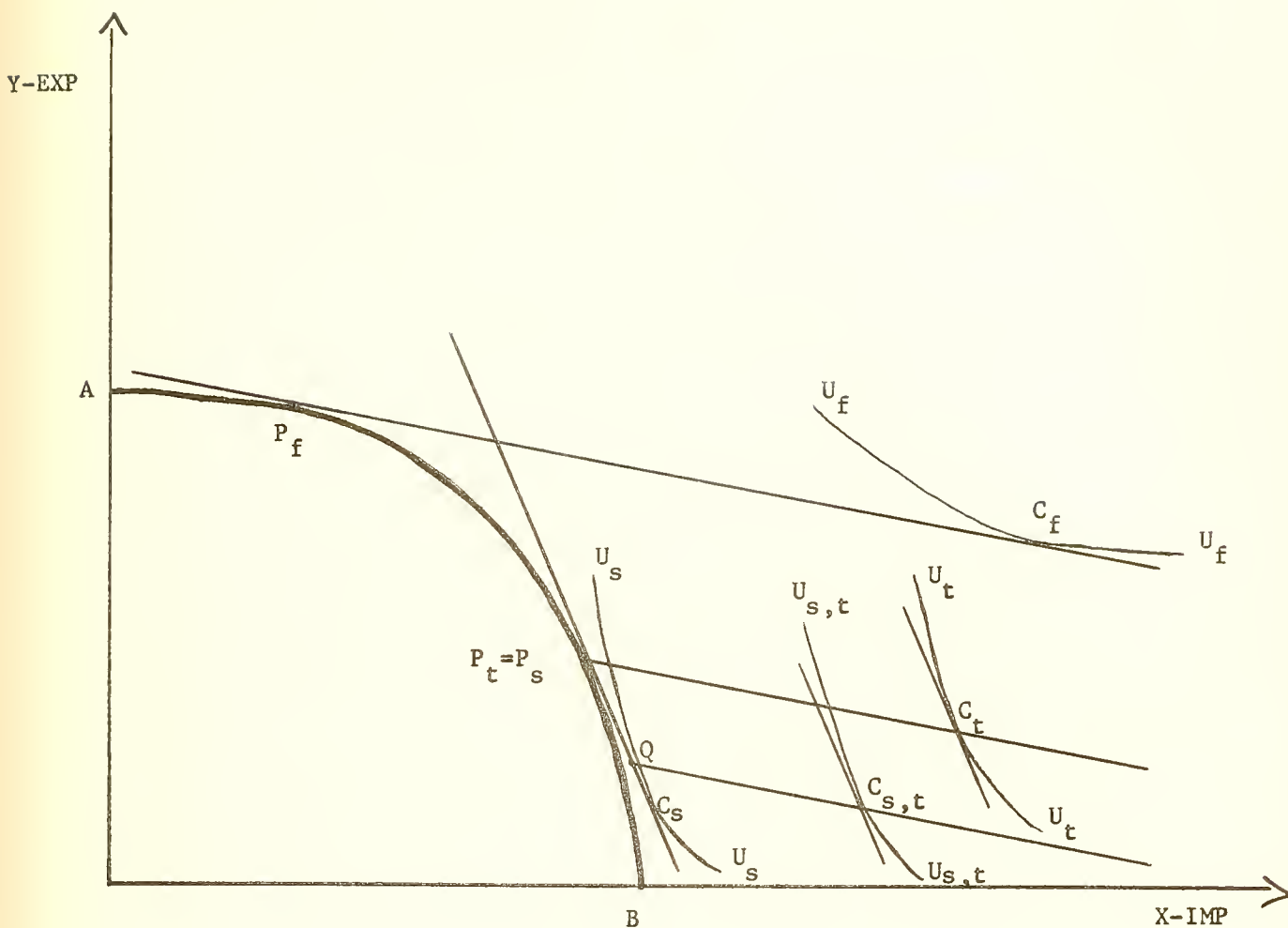


Figure (3)\*

Perfect Competition in Smuggling at Constant Costs (cont.)

\* In this figure, the smugglers' transformation line,  $P_s C_s$ , coincides with the tangent to AB at  $P_t (= P_s)$ . If the smugglers have all trade, the welfare level will be  $U_s$  with the consumption point  $C_s$ .  $C_s$  is clearly inferior to  $C_t$ ; therefore  $U_s < U_t$ . With smuggling at Q, legal trade will lead to the consumption point  $C_{s,t}$  at welfare level  $U_{s,t}$ . We have always  $U_s < U_{s,t} < U_t$ . The first inequality is obvious; it means that some legal trade is better than no legal trade. The second inequality follows from the circumstance that, if  $U_t < U_{s,t}$ , which is easily seen to be possible, there would exist at least one more equilibrium point on the trade line,  $P_t C_t$ , at a higher welfare level than  $U_{s,t}$  (Bhagwati, 1968).



can have smuggling coexisting with legal trade, whereas in the preceding case, with constant costs in both smuggling and legal trade, smuggling, if profitable at all, eliminated legal trade apart from a special border-line case. This possibility of legal trade coexisting with smuggling is not merely a theoretical curiosum: in real life it is probably the most common case and, as we show below, it turns out to be critical to the welfare effects of smuggling (indeed, as we have already seen in the border-line case above).

Let us initially discuss the cases where smuggling eliminates trade, despite increasing costs. Figure 4 illustrates this possibility. The smuggling transformation curve,  $P_s C_s$ , now exhibits diminishing returns, and the equilibrium under smuggling shows the domestic price-ratio, at which production and consumption take place, to be the line  $P_s C_s$ . Since  $P_s C_s$  is steeper than the legal-trade price line,  $P_f C_f$ , legal trade has been eliminated. Smuggling is shown to lower welfare vis-à-vis the non-smuggling situation:  $U_s < U_t$ .

On the other hand, Figure 5 shows just the opposite:  $U_t < U_s$ , and smuggling has improved welfare. Thus, we have the following theorem:

Theorem III: For non-prohibitive tariffs, and increasing costs and perfect competition in smuggling, smuggling cannot be uniquely welfare-ranked vis-à-vis non-smuggling when legal trade is eliminated by smuggling.

Consider, however, the case where legal trade is not eliminated in the smuggling situation. Figure 6, which is a variant on Figures 4 and 5, illustrates this case. In the smuggling situation, the domestic price will now be the tariff-inclusive price: so both production (at  $P_s$ ) and consumption (at  $C_s$ ) must be at tariff-inclusive prices. The point of trade on the smuggling transformation curve,  $P_s Q_s$ , must be (at Q) where the average terms

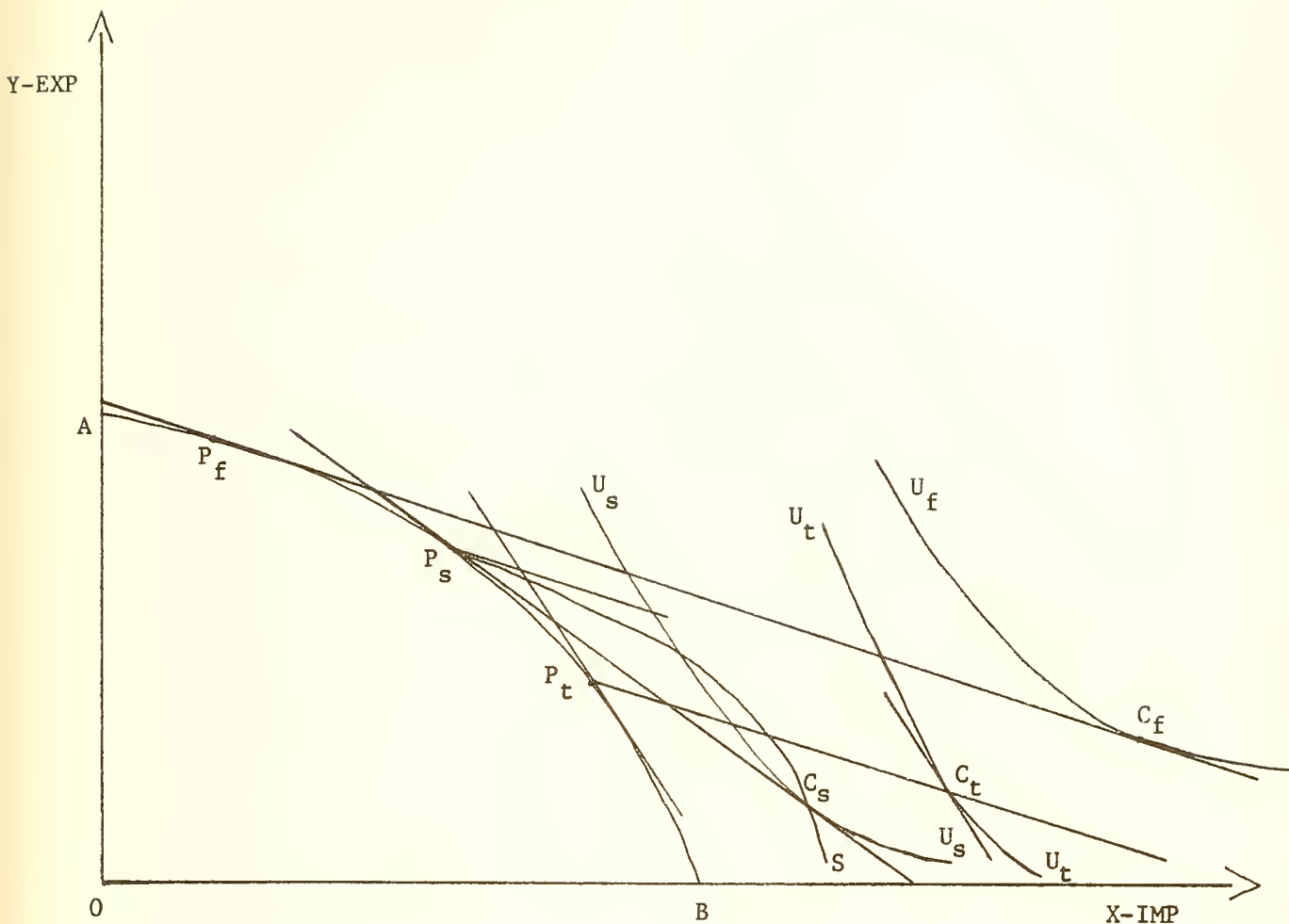


Figure (4)\*

Perfect Competition in Smuggling at Increasing Costs

\* This figure is identical with Figure (1), but we now have increasing costs in smuggling. The transformation curve for smuggling is  $P_s C_s S$ , and the equilibrium for the smuggling situation is characterized by production at  $P_s$ , where the average (recall the assumption of individual constant rate of transformation) transformation rate in smuggling (the straight line,  $P_s C_s$ ) is tangential to AB and by consumption at  $C_s$ , where the same rate is tangential also to  $U_s$ . Again, legal imports are eliminated, and  $U_s < U_t$ .

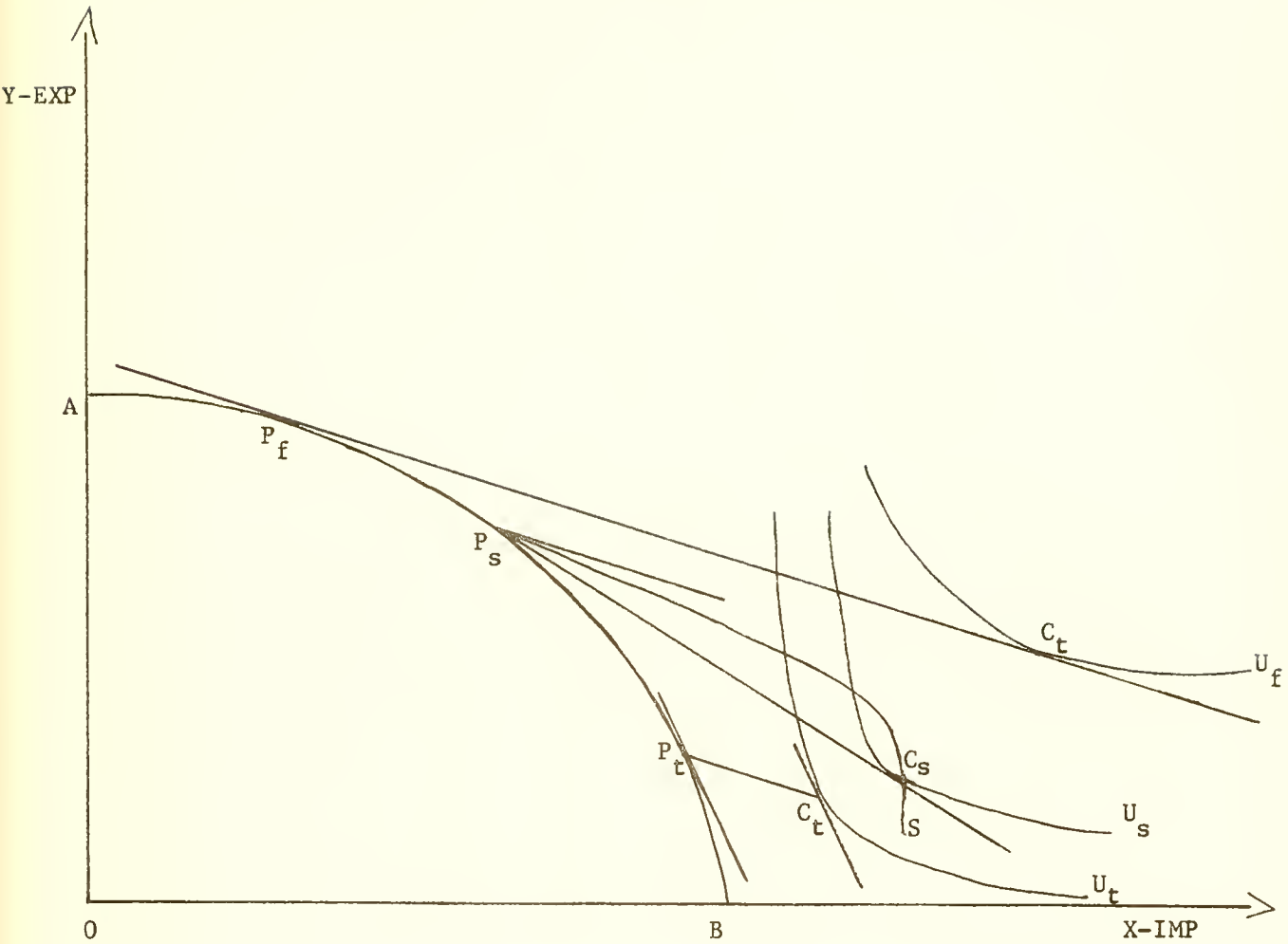


Figure (5)\*

Perfect Competition in Smuggling at Increasing Costs (cont.)

\*This figure is identical with Figure (4), except that we now show smuggling to result in greater welfare than legal trade:  $U_s > U_t$ . Again, in the smuggling situation, legal imports are eliminated.

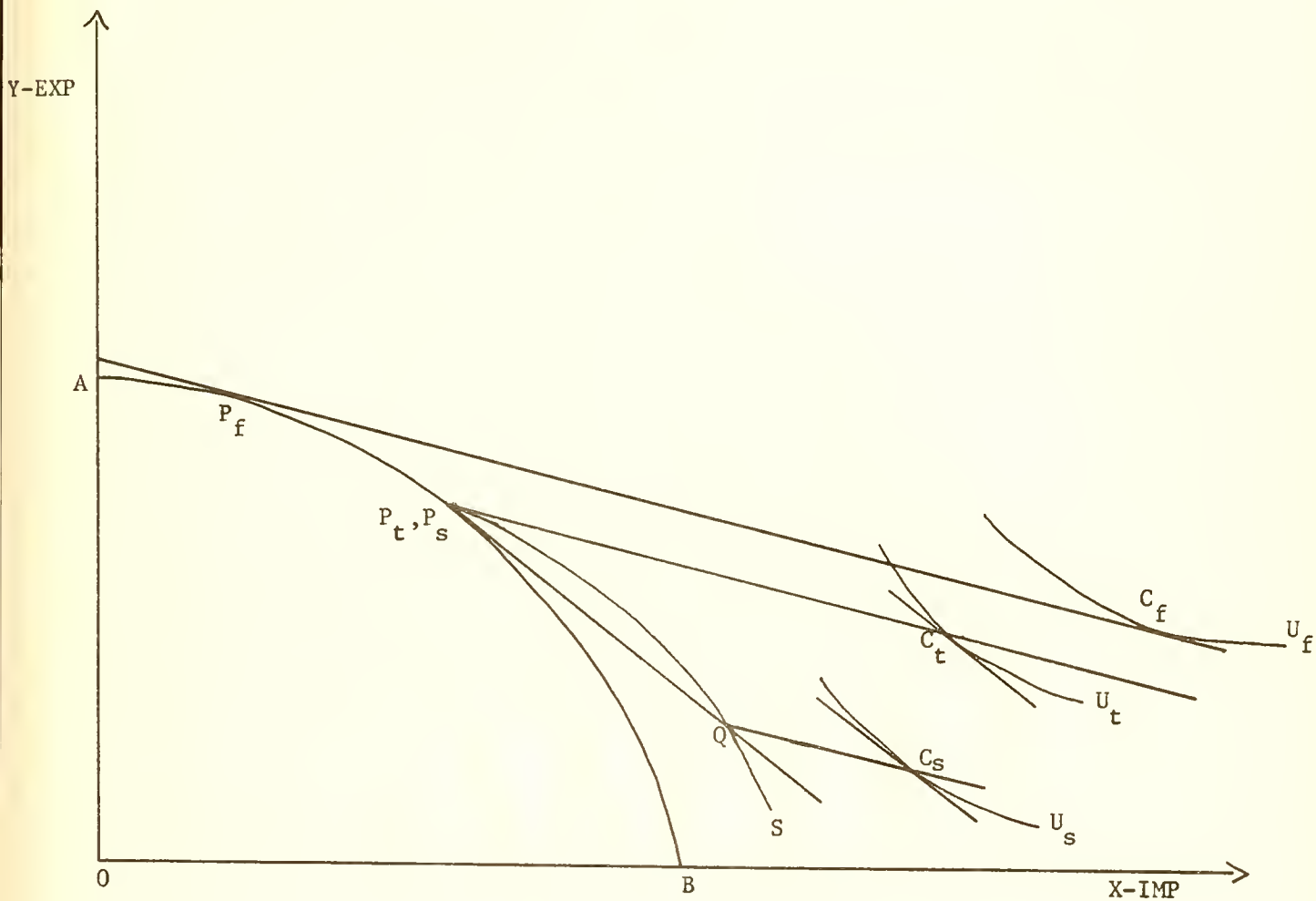


Figure (6)\*

Perfect Competition in Smuggling at Increasing Costs (cont.)

\* This diagram shows a situation where smuggling and legal trade co-exist in equilibrium. The production points,  $P_t$  and  $P_s$ , therefore coincide; smuggling takes the availability point to  $Q$  and then, at international prices, to  $C_s$  and welfare  $U_s < U_t$  (the welfare which would be achieved under legal trade alone); see remarks to Figure (3) concerning the possibility of  $U_s > U_t$ , in case of multiple equilibria.

of trade (we have individual constant returns) are again the same as the domestic price-ratio. However, legal trade must occur at the international price-ratio, the slope of  $QC_s$ . It is clear, then, that smuggling worsens welfare, and we thus have the theorem:

Theorem IV: For non-prohibitive tariffs, and increasing costs and perfect competition in smuggling, when legal trade is not eliminated, smuggling necessarily reduces welfare vis-á-vis the non-smuggling situation.

The rationale for Theorem IV is again readily seen. The smuggling situation, vis-á-vis the non-smuggling situation, now imposes identical production and consumption distortions on the economy, while also imposing a terms-of-trade loss; smuggling must therefore necessarily be a welfare-reducing phenomenon in this instance.

#### Monopoly in Smuggling at Constant Costs

When smuggling is monopolistic, the marginal rate of transformation in smuggling will be equated with the domestic price-ratio. However, for constant costs in smuggling, the marginal and average rates of transformation are identical, and hence the results are identical with the case where smuggling is competitive. Hence we have the following theorem:

Theorem V: For non-prohibitive tariffs, and constant costs and monopoly in smuggling, smuggling cannot be uniquely welfare-ranked vis-á-vis non-smuggling.

#### Monopoly in Smuggling at Increasing Costs

However, when there are increasing costs in smuggling, we have to distinguish between marginal and average terms-of-trade in smuggling. As with the competitive case, we find that the ranking of smuggling vis-á-vis

non-smuggling is critically dependent on whether smuggling eliminates legal trade.

In Figure 7, we illustrate a case where smuggling does eliminate legal trade. The difference from Figure 5, where the case of competitive smuggling under increasing costs was discussed, is that the smuggling equilibrium is characterized by equality of domestic prices and the marginal rate of transformation in smuggling--the tangents to the production possibility curve AB at  $P_s$ , to the transformation curve  $P_s S$  at  $C_s$ , and to the social indifference curve  $U_s$  at  $C_s$  are parallel. We here depict a case where  $U_s > U_t$ : smuggling is welfare-improving. We could, however, equally readily have redrawn the diagram to show  $U_s < U_t$ --i.e., that smuggling had reduced welfare.

We thus have the following theorem:

Theorem VI: For non-prohibitive tariffs, and increasing costs and monopoly in smuggling, smuggling cannot be welfare-ranked vis-à-vis non-smuggling when legal trade is eliminated by smuggling.

Recalling Theorem III, therefore, we note that the conclusion is identical regardless of whether smuggling is competitive or monopolistic.

Consider now, however, the case where smuggling fails to eliminate legal trade. Figure 8 illustrates this case. As with the competitive smuggling case, we find that  $U_s < U_t$  and that smuggling necessarily reduces welfare. Again, it is easy to see why: with legal trade continuing, the distortion in domestic production and consumption must be identical between the smuggling and non-smuggling situations, whereas the presence of smuggling imposes an (additional) terms-of-trade loss. Thus we can conclude:

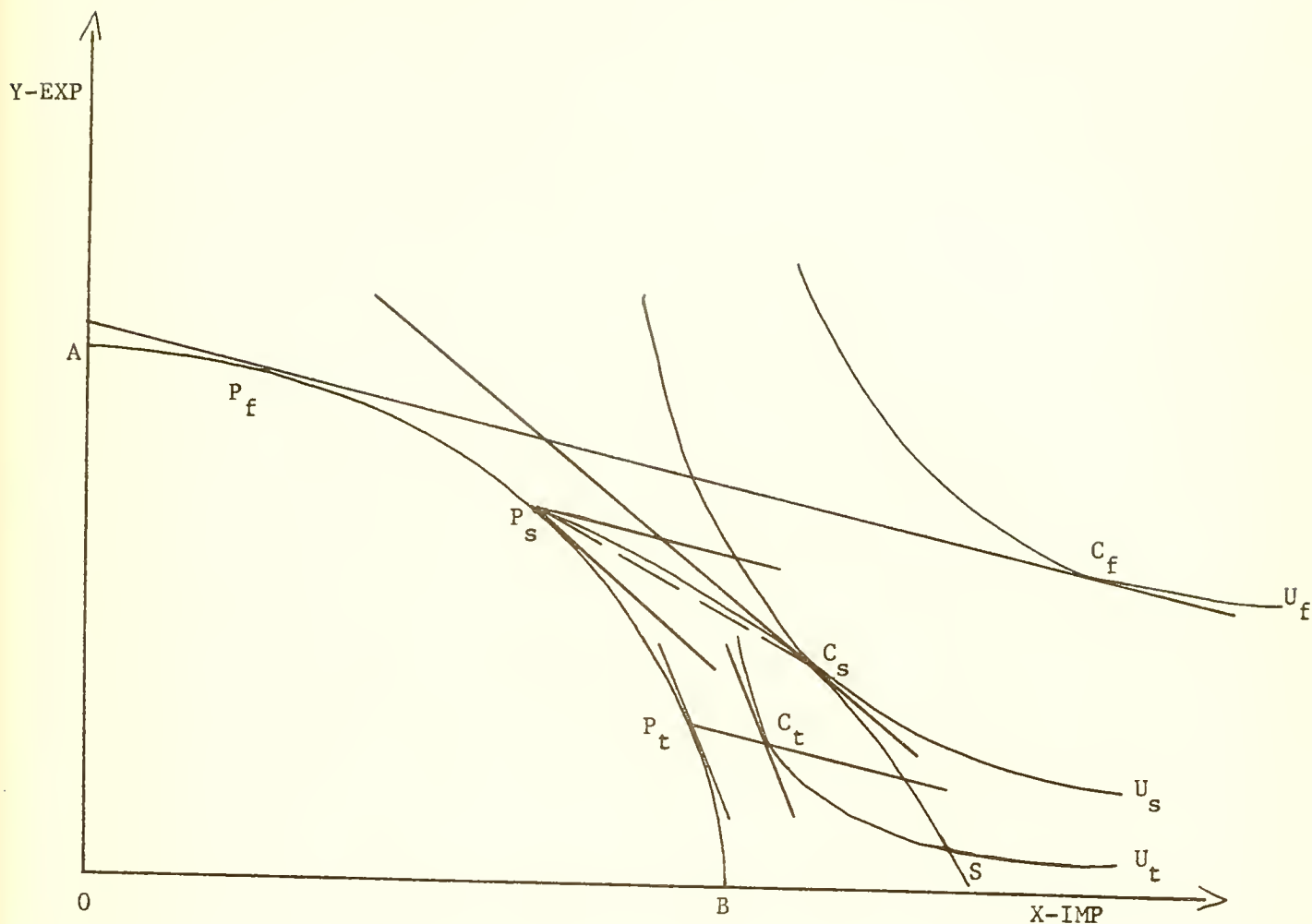


Figure (7)\*

Monopoly in Smuggling at Increasing Costs

\*This figure is similar to Figure (5): legal trade is eliminated and  $U_s > U_t$ . However, instead of depicting smuggling on the perfectly competitive assumption, we now equate the marginal rate of transformation in smuggling (at  $C_s$ ) with the marginal rate of transformation in domestic production and domestic prices (at  $P_s$ ). Smuggling improves welfare over the legal trade situation.

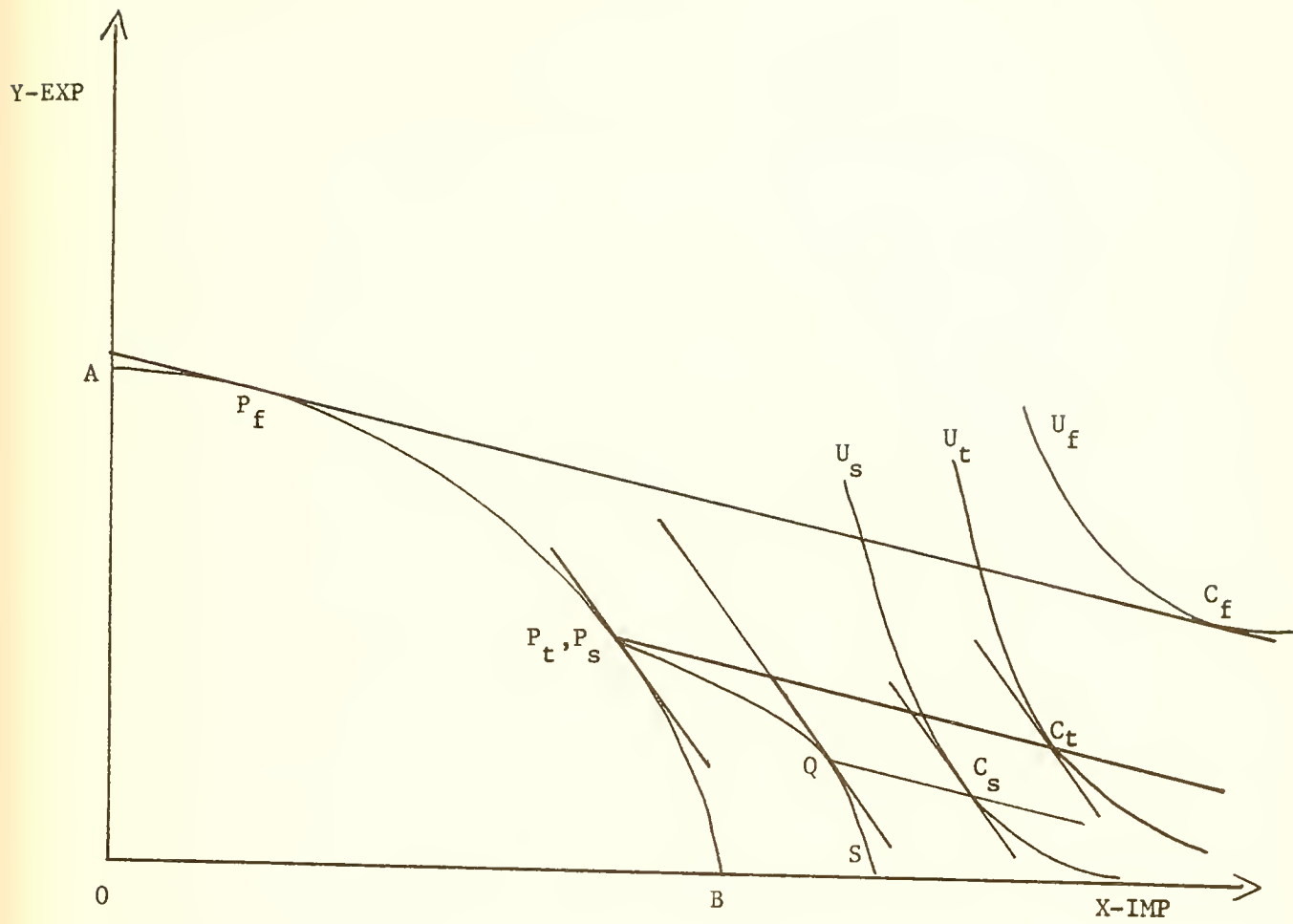


Figure (8)\*

Monopoly in Smuggling at Increasing Costs (cont.)

\* This diagram shows the simultaneous presence of smuggling and legal trade in equilibrium. It is easy to see that, in this case of continued legal trade in the presence of smuggling, smuggling is necessarily inferior to non-smuggling:  $U_t > U_s$ . Concerning the possibility  $U_t < U_s$ , in case of multiple equilibria, see remarks to Figure (3).



Theorem VII: For non-prohibitive tariffs, and increasing costs and monopoly in smuggling, smuggling is necessarily inferior to non-smuggling when smuggling does not eliminate legal trade.

Note, however, that we have explicitly qualified Theorems I-VII by stating them as valid for non-prohibitive tariffs alone. The reason for this is clear enough. When we consider a prohibitive tariff, the non-smuggling situation is autarkic. Smuggling then makes trade feasible; the appropriate analogy now is with a trade-creating customs union, as distinct from a trade-diverting customs union, and clearly gains must necessarily accrue from smuggling. We can thus conclude:

Theorem VIII: For prohibitive tariffs, smuggling is necessarily superior to non-smuggling, whether smuggling is competitive or monopolistic, and subject to constant or increasing costs.

#### Perfect Competition vs. Monopoly in Smuggling

A comparison between Figures 6 and 8 leads directly to the conclusion:

Theorem IX: When legal trade and smuggling coexist at non-prohibitive tariffs and increasing costs in smuggling, monopoly in smuggling is better than perfect competition.

In other words, the more smugglers we put in jail, the better! This sounds quite reasonable and proper: economics and morality coincide in their prescriptions! When legal trade is eliminated, however, monopoly and competition cannot be ranked thus. And at constant costs the two are identical (on our assumptions). Theorem IX is analogous to the familiar proposition in optimum tariff theory that the exercise of monopoly power by a country

improves its welfare. In this instance, the smuggler's exercise of his monopoly power is tantamount (on our assumptions) to the country adopting an optimum-tariff policy along the smuggling transformation curve; hence it clearly yields a superior welfare level than if smuggling were competitive.

## II. Exogenously-Specified Objectives: Target-Increase in Importable Production

The preceding analysis is essentially of interest where the economist thinks either that the tariff policy is misconceived or that it is an historical accident. In either case, the economist is likely to argue--and indeed such arguments are frequently asserted in practice--that smuggling must be welfare-improving, a notion which we have just demonstrated to be unsustainable as a general proposition.

But suppose now that the tariff has been imposed to achieve some definite end. Assume that the government wishes to achieve a prespecified degree of protection for the import-competing industry. We can then argue the following theorem:

Theorem X: To attain a feasible target-increase in domestic production of the importable good, a tariff with no smuggling is superior to a tariff with smuggling.

This theorem is illustrated in Figure 9. With the production point fixed by the target-specification at  $P_s(P_t)$ , it follows that  $U_s < U_t$ . Again, the rationale of this theorem can be readily grasped by noting that the fixing of the production point makes the production distortion identical

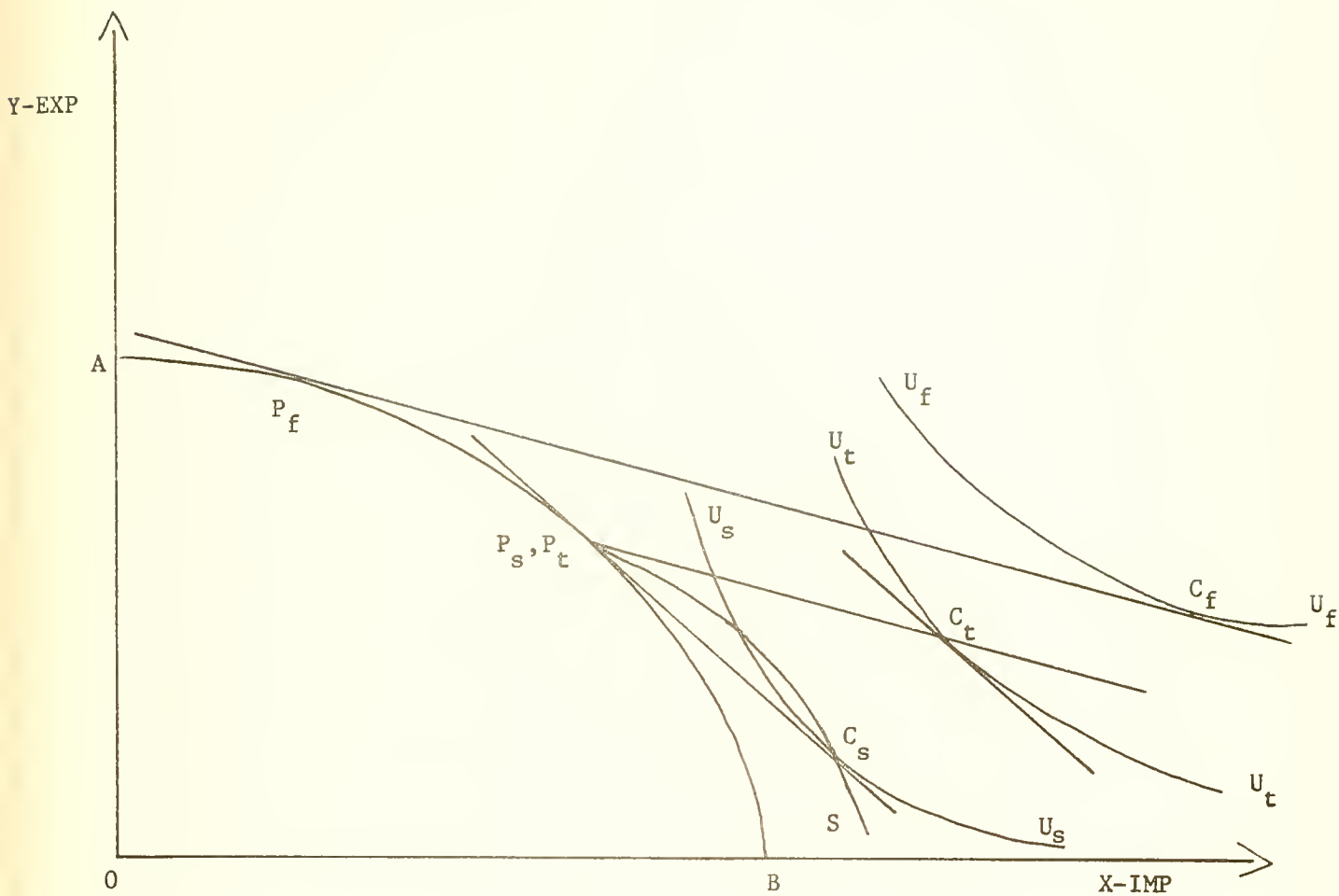


Figure (9)\*

Smuggling at Pre-determined Production Point

\* This figure illustrates Theorem X. Note that the production of X, the importable good, cannot fall below  $P_s = P_t$ . A suitable tariff, in the absence of smuggling, will take welfare to  $U_t$ . A higher tariff, in the presence of smuggling (at transformation curve  $P_s C_s S$ ), would (necessarily) produce lower welfare at  $U_s$ . The same theorem could be illustrated for the case where smuggling does not eliminate legal trade, as also for monopolistic smuggling.

between the smuggling and the non-smuggling situations, whereas the terms-of-trade under smuggling are inferior to those under legal trade. Consumption is again at identically-distorted prices (at  $C_t$  and  $C_s$  under the non-smuggling and the smuggling situations respectively). Hence smuggling must necessarily worsen welfare.

Theorem X is of interest not merely because it reinforces our critique of the customarily complacent view of smuggling, but also because it would seem to us to provide yet another argument in support of the view that, for a production non-economic objective, a production tax-cum-subsidy policy is superior to a tariff policy (see Corden, 1957, and Bhagwati-Srinivasan, 1970). In the presence of smuggling, the tariff rate needed to encourage domestic import-competing production is clearly greater than if smuggling is not present, and this conclusion is clearly of considerable significance to countries such as Afghanistan and Indonesia, where smuggling assumes considerable dimensions.

### III. Overinvoicing and Underinvoicing of Transactions

Our analysis of smuggling can also be readily extended to quasi-smuggling phenomena such as the overinvoicing and underinvoicing of transactions on legal trade.<sup>5</sup> We demonstrate how this can be done for the case where the presence of a tariff duty leads to underinvoicing of imports.

We should distinguish between two possibilities: (1) where the underinvoicing of imports amounts merely to a de facto reduction in the tariff, so that the smuggling situation is equivalent to a lowering of the tariff,

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<sup>5</sup>For earlier analyses of such phenomena, seeking different answers, see Bhagwati (1969), Bhagwati and Desai (1970), and Winston (1970).

and (2) where the resulting gain to the importer has to be shared, in some degree, with the exporter who collaborates in the faking of the invoices, in which case the effective c.i.f. price of importation to the importing country rises, entailing a terms-of-trade loss.

Clearly, the latter case is equivalent to our analysis of smuggling and therefore no modification in our conclusions is necessary. However, in the former case, our theorems get critically affected. For, with under-invoicing amounting only to a lower tariff, it follows that it must necessarily be superior to a non-underinvoicing situation, and for the case where a target-specified degree of domestic production of the importable must be achieved, it clearly makes no difference now whether there is faking of invoices or not; with faking, the tariff will just have to be set higher, and the faking-inclusive real situation will then be identical with that which would have obtained without faking but with a lower tariff.<sup>6</sup>

#### IV. Conclusions

We have thus managed to incorporate successfully the phenomena of smuggling and faked invoicing into the welfare analysis of tariffs. Our analysis is clearly generalizable, and in a sequel to this paper we propose to extend our analysis into two major areas: (1) the welfare analysis of domestic taxation, and (2) other propositions in the theory of trade and welfare.

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<sup>6</sup>As with smuggling, however, the degree of protection sought may be unattainable in the presence of faking of invoices.

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