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TARIFFS AND TRADE

UNITED STATES - TAXES ON PETROLEUM AND CERTAIN IMPORTED SUBSTANCES

Follow-up on the Panel report

Note by the GATT Secretariat¹

I. INTRODUCTION

1. In February 1987, the Council established a Panel to examine the complaints by Canada, the European Economic Community and Mexico concerning United States taxes on petroleum and certain imported substances. The Panel report (L/6175) was adopted by the Council in June 1987.

2. In March 1988, the Council was asked by the Community to authorize in accordance with Article XXIII:2 the withdrawal of equivalent concessions granted to the United States (C/W/540). In May, the Community submitted to the Council a request for retaliation in respect of specific United States products (C/W/540/Add.1).

3. At the Council meeting on 16 June, the Secretariat was asked to give technical advice to the two parties regarding the Community's request. This was to be technical advice to determine whether the Community's assessment of damages was correct and, if not, what the appropriate amount, if any, would be. This technical advice was also to be made available by the Secretariat to other contracting parties (C/M/222, item No.10).

4. This Note provides technical advice on the following issues raised in C/W/540/Add.1 related to the Community's assessment of damages:

- The accuracy of the trade data utilized in the Community's calculations.
- The calculation of the annual injury to the Community from the 3½¢ per barrel tax differential.
- The calculation of the percentage increase in the United States tariff resulting from the 3½¢ tax differential.
- The calculation of the impact of the 2½ per cent additional ad valorem duty proposed by the Community.
- The calculation of the percentage increase in the Community's tariff rate due to the 2½ per cent additional ad valorem duty.

In addition to the methodological questions raised by these various calculations, there is also the issue of whether the calculated amounts of injury and retaliation are appropriate.

¹Copies of the text of this document were made available in the Council Room on 22 September 1988.

II. THE ACCURACY OF THE TRADE DATA

(A) THE DATA ON IMPORTS INTO THE UNITED STATES FROM THE COMMUNITY

5. This question subdivides into two parts:

- (i) Is the Community's assumption about the product coverage of the 3½¢ tax differential, as reflected in Annex I of C/W/540/Add.1, correct?

It is not possible to give an exact answer to this question because of the lack of information on precisely which products are covered by the term "certain other liquid hydrocarbon products" (see paragraph 5.1.1 of L/6175).¹ The United States has indicated that it believes that the product coverage assumed by the Community is essentially correct.

- (ii) Are the trade data in Annexes I and II of C/W/540/Add.1 correct?

Using the Community's assumption about product coverage, the Secretariat's review of the trade data found only very minor differences between the figures for 1984-86 and those available in the United Nations trade data base (see below).

(B) THE DATA ON IMPORTS INTO THE COMMUNITY FROM THE UNITED STATES

6. The Secretariat's review of the data in Annex IV of C/W/540/Add.1 indicates that the Community's statistics are correct.

III. ESTIMATING THE TRADE EFFECTS

(A) OVERVIEW OF METHODOLOGICAL ISSUES

General equilibrium versus partial equilibrium analysis

7. Most economic policy actions - even those which are quite narrow in their product or country coverage - have, in principle, repercussions beyond the particular sector in which they are applied, both at home and abroad.² An analysis which attempted to take all repercussions into account would be a general equilibrium analysis.

¹Because the United States legislation does not specify the affected products in terms of their TSUS numbers, an additional difficulty in determining import figures is the need to determine precisely which TSUS categories are covered.

²For example, a change in the tariff on crude petroleum can affect the demand for such items as gasoline, automobiles, coal, heating insulation and motel rooms. Since these goods and services are tradeable, a change in the tariff on crude petroleum, even when it is MFN, can have repercussions on other countries according to their trade interest not only in crude petroleum, but also in these other goods and services.

8. When a single policy change involving a relatively product-specific measure is being considered, it is common practice to assume that the effects outside the specific product market are sufficiently small that they can be safely ignored. Such partial equilibrium analysis is not only convenient, but often necessary because of the great difficulty of utilizing a general equilibrium approach in detailed empirical work.

9. The analytical approach outlined below for estimating the trade effects of the 3½¢ Superfund tax differential is a partial equilibrium approach. Given the relatively small size of the tax differential, the repercussions outside the petroleum sector are almost certainly very small (the pollution control industry perhaps being a modest exception to this generalization since the revenue collected is being used for toxic waste clean-up).

"Producers' surplus" versus lost export revenue

10. In evaluating the gains and losses from changes in trade policies, economists routinely utilize the concepts of consumers' surplus and producers' surplus.¹ Popular discussions, in contrast, often assume that the gains or losses are measured in terms of the change in trade flows, expressed either in volume terms or value terms. In most instances, the former approach yields a more meaningful measure of the gains or losses, and it is the one recommended in this Note for use in evaluating the effects of the 3½¢ Superfund tax differential. However - and this point bears emphasis - the following analysis is equally applicable should a decision be made to base the estimates on the concept of lost export revenue.

11. The Annex to this Note includes charts illustrating the distinction² between a decline in producers' surplus and a decline in export revenue. The distinction between the two may also be illustrated by the following brief examples:

- If the exporters responded to the 3½¢ tax differential by cutting their prices 3½¢ per barrel, they would continue to sell the same number of barrels, but total revenue would decline. This lost revenue would come out of profits and the producers would be unambiguously worse off. In this instance, the lost revenue also represents (measures) the loss in producers' surplus.
- Alternatively, they may refuse to absorb the 3½¢ tax, in which case they are likely to lose part of their market share in the United States, and export revenue from sales to the United States

¹There is a close correspondence between the concept of producers' surplus and the concept of "economic rent", and the latter term is often used in place of producers' surplus.

²Since the impact of the 3½¢ tax differential on consumers is not considered in this Note, consumers' surplus does not enter the analysis.

will decline. But if they are able to sell the surviving exports to the United States at the original price, and can sell the barrels diverted to other countries for the original price, there is no loss of producers' surplus.¹ Revenue from sales in the United States is down, but total export revenue and total profits are unchanged.²

12. To sum-up: In each case the imposition of the 3½¢ per barrel tax differential leads to "lost trade" in the sense of reduced export revenue from sales to the United States. But the impact of the 3½¢ tax differential on the welfare (profits) of the exporters would be different in the two cases - a fact which presumably should be taken into account in assessing the injury/damage caused by the tax differential. In other words, when export revenue declines, it matters whether the exporters are selling the original number of barrels of petroleum at a lower price, or fewer barrels at the original price, since in the former case there is a terms of trade loss whereas in the latter the terms of trade remain unchanged.

Demand and supply elasticities

13. Any analysis of the impact of a price-related policy change on trade volume, export revenue or producers' surplus must be based (explicitly or implicitly) on assumptions about the relevant demand elasticities and supply elasticities. For instance, the first example in paragraph 11 assumed that the export supply was completely inelastic (that is, completely unresponsive to a decline in price), while the second example assumed that the supply of exports was infinitely elastic at the pre-Superfund price per barrel. In practice, these two assumed elasticity values (zero and infinity) are frequently less plausible than a range of intermediate values, particularly beyond the short-term.

¹If the reduced sales to the United States cannot be fully made up by increased sales to other petroleum-importing countries, there will be a decline in both export revenue and in producers' surplus, and the exporters will be worse off. However - and this is the key point - the decline in export revenue (which exceeds the decline in producers' surplus) will overstate the amount of loss to the country because (i) in the short-run the country has more petroleum to consume at home, and (ii) in the longer-run some of the land, labour and capital in the petroleum industry can be employed to produce other goods and services. If the loss were measured in terms of the loss in producers' surplus, there would be no overstatement. (See also Chart 4 in the Annex.)

²This approach ignores adjustment costs involved in finding new markets for the petroleum diverted from the United States market. It also ignores adjustment costs incurred by factors of production when a failure to find new markets makes it necessary to find employment in other industries.

14. Credible empirical estimates of price elasticities are scarce, however, not just in the petroleum sector, but in all sectors. While this problem is somewhat less severe in the case of import demand elasticities, estimates of the relevant export supply elasticities are virtually non-existent.¹ This presents difficulties for empirical work under the best of circumstances. When the purpose of the empirical work is to help resolve a dispute between two or more parties, the difficulties are even more pronounced.

Short-term effects versus long-term effects

15. In the real world, firms' adjustment to change - such as a change in the price a firm is offered or receives for its product - is seldom instantaneous, even when it is clear that the change is not transitory.² In technical terms, the elasticity of export supply generally increases over the normal adjustment period for the industry in question, that is short-term elasticities are usually smaller than long-term elasticities. But this means that the answer to the question of the trade effects of a particular policy action depends on the period being considered. In the case at hand, this raises the possibility that the impact of the 3½¢ Superfund tax differential on the Community's petroleum industry was different in 1987 from what it will be in 1989.³ This obviously is an added complication in any attempt to arrive at an accurate estimate of the impact of the tax differential on the Community's petroleum industry.

The non-discriminatory component of the Superfund tax

16. The total Superfund tax on imported petroleum and petroleum products is 11.7¢ per barrel. The focus of this Note, in contrast, is on the effects of the differential between that 11.7¢ tax and the corresponding 8.2¢ tax on the domestically produced products, because that was the issue before the Panel. To keep the analysis as simple as possible, the analysis in this Note, particularly in the graphs in the Annex, assumes that the policy change involved imposing an additional 3½¢ per barrel tax on imported petroleum, but no new tax on domestically produced petroleum. The principal considerations of this Note are not affected by this assumption.

¹As is evident from the discussion in paragraph 11 above, export supply elasticities are crucial to the analysis of the impact of policy changes on producers/exporters - that is to the analysis of the kinds of questions dealt with in this Note.

²The initial response, for example, to downward pressure on price in a particular market may be to cut the price to maintain market share. Meanwhile the firm looks around for other markets, or for other products to produce, and as time goes on there will be a decline in exports of the product in question to the market where the price came under pressure.

³This presumption needs to be qualified to the extent that the Community's petroleum industry assumed that the Community's action in the GATT would lead to an early repeal of the 3½¢ tax differential. For example, the Community's exporters might be more willing to cut prices to maintain United States market shares if they expected the tax differential to be removed long before its scheduled termination on 31 December 1991.

The impact on the Community versus the impact on other countries exporting petroleum to the United States

17. While the discussion in this Note focuses on the impact of the 3½¢ tax differential on the Community's petroleum industry, the analysis allows for the fact that the tax differential applies to imports of petroleum products from all sources. It is helpful to keep this point in mind since the analysis of the second part of C/W/540/Add.1 involves estimates of the impact of a 2½ per cent additional duty that applies only to imports into the Community from the United States.

(B) ESTIMATING THE INJURY

18. As was noted above, any calculation of lost producers' surplus or lost export revenue for the Community involves, explicitly or implicitly, assumptions about the response of the Community's export supply to the change in prices (if any) received by Community exporters which is induced by the Superfund tax differential. The difficulty is that empirical estimates of price elasticities of supply or demand, if available at all, usually vary substantially depending on the model used (level of product disaggregation, factors included in the analysis, underlying time period, technique of estimation, and so forth). The choice of the various elements of the estimation procedure necessarily involves a measure of subjectivity. This is why objective and precise empirical estimates of short-run or long-run price elasticities of export supply and demand for petroleum and petroleum products of the Community are non-existent.

19. One way of dealing with this situation is to work with assumed values for the elasticities. As far as export supply is concerned, the two polar cases are:

- The export supply of petroleum and the various petroleum products from the Community to the United States market is perfectly elastic at the pre-Superfund price; that is, at that price Community exporters will supply whatever volume of petroleum and petroleum products is demanded by the United States. In this case, the imposition of a tax on imports will generally result in a decline in the quantity supplied (see Chart 2 in the Annex).
- The export supply of the Community is perfectly inelastic with respect to the export price; that is, Community exporters will supply the current number of barrels of petroleum and petroleum products, regardless of the export price for these commodities in the United States (see Chart 3 in the Annex).¹

20. If the injury estimates are based on either of these cases, the only information required to estimate the loss in producers' surplus is the volume of petroleum and petroleum products exported to the United

¹It is important to note that this assumption does not imply that the export volume of the Community remains constant over time. It only excludes changes in the export volume induced by changes in export prices.

States prior to the imposition of the Superfund tax. As is shown in the Annex, the annual loss in producers' surplus would be zero in the first case (perfectly elastic export supply), and equivalent to the Superfund tax differential times the number of barrels exported to the United States in the pre-tax year in the second case (perfectly inelastic export supply).¹ As is noted in the Annex, the latter amounts to calculating the potential maximum loss of producers' surplus.²

21. It may well be that the true price elasticities of supply of petroleum and petroleum products from the Community to the United States market lie somewhere between these polar cases. Under these circumstances, a precise estimation of injury in terms of lost producers' surplus or lost export revenue would require not only information on the elasticity of export supply of these products from the Community, but also information on the price elasticities of United States import demand for petroleum and petroleum products from the Community.

22. Given (i) that there is no way of quantitatively determining injury without the implicit or explicit use of price elasticities, and (ii) that there is no way of objectively determining those elasticities, there is a need to provide for a pragmatic approach to settling the injury issue. The Secretariat's suggestion is that the parties consider the following three options:

Option 1. The parties involved agree that the injury calculation will be based on the assumption that the export supply is perfectly inelastic over the relevant range with respect to export price. This assumption makes the calculation of injury very simple. As was noted above, the resulting estimate represents the potential maximum loss in producers' surplus.

Option 2. The parties involved agree that the injury calculation will be based on the assumption of perfectly inelastic export supply except for those products for which the protecting country (in the present case, the United States) can demonstrate to the satisfaction of the other party, or parties that reasonable estimates of all relevant price elasticities are available.

Option 3. The parties involved agree to select a figure for the injury that lies between zero and an amount equal to the maximum loss in producers' surplus. For example, the parties could agree to apply a "split-the-difference rule" or to apply a "two-thirds

¹If the injury assessment were to be based on the concept of lost export revenue, more information would be necessary for the calculations. In particular, the calculation of lost revenue in the first case (perfectly elastic export supply) cannot be made unless the price elasticity of import demand in the United States is known (or an assumption about this elasticity is made). In the second case (perfectly inelastic export supply), lost export revenue equals lost producers' surplus.

²As was indicated in footnote 2 on page 4, above, a comprehensive assessment of injury would include adjustment costs (if any) incurred in the exporting country. The quantitative estimation of these costs would present very formidable problems, however.

rule" (that is, the agreed injury is two-thirds of the estimated maximum injury). This option could also be defined to include the possibility of agreeing that no injury had occurred.

23. The choice of Option 1 leads to the following results:

- (i) By assumption, export supply from the Community to the United States market for each individual petroleum product is completely inelastic. As a result, the calculation of the loss in producers' surplus - that is, of the injury - can be made on the basis of the aggregate import volume for all products. According to the statistical information available to the Secretariat, the volume of exports of petroleum and petroleum products from the Community into the United States was 220.8 million barrels in 1986, excluding lubricating oil and greases and hydrocarbon mixtures for which import quantities were not available. Multiplying the 3½¢ Superfund tax differential by this import volume yields an annual loss of producers' surplus, or injury, of \$7.73 million (on the basis of the average annual import volume during 1984-86 of 207.5 million barrels, the injury would be \$7.26 million).

It is evident that the Community, in effect, applied Option 1, and that the Secretariat's result is very close to that in C/W/540/Add.1.

- (ii) According to the Secretariat's calculations, the tax differential represents an increase in United States tariff protection ranging from 7 to 66 per cent (not 33 to 66 per cent, as reported in C/W/540/Add.1).¹

24. The Secretariat is currently not in a position to present estimates of the injury based on Option 2 because the parties involved have not agreed on the elasticity values to be used.

25. Under Option 3 a "split-the-difference rule" would yield an annual injury of \$3.87 million using 1986 import volume, and of \$5.15 million applying a "two-thirds-rule" to 1986 import volume.

¹For example, jet fuels are subject to a unit tax of 1.25¢ per gallon. With a unit value of 40.8¢ per gallon, the ad valorem equivalent is 3.1 per cent. The Superfund tax differential of 3½¢ per barrel works out to .083¢ per gallon (1 barrel = 42 gallons) for an ad valorem equivalent of 0.2 per cent. The new ad valorem tariff rate is 3.3 per cent, for a percentage increase in the tariff rate of about 7 per cent.

Knowledge of the absolute levels of the duties is also helpful in gaining a perspective on the changes in the margin of protection (for example, a 50 per cent increase in a tariff could indicate either an increase in the duty from 40 to 60 per cent, or from 2 to 3 per cent).

26. In applying any of these three approaches, a number of general points should be kept in mind, including:

- The injury calculations should be based on United States imports of the affected products from the Community, rather than on net imports from the Community or, what amounts to the same thing, on Community exports rather than on the Community's net exports to the United States.
- Normally, the data used in making the injury estimates would be taken from the last full twelve months (or last full calendar year) prior to the introduction of the new restrictive measure. If the parties agree that this is an especially unrepresentative period, one alternative would be to use an average of two or more twelve-month periods.
- Prices should be average (representative) c.i.f. prices for imports of the relevant products from the Community and not, for example, spot prices or wholesale prices. Where c.i.f. prices are not available, one alternative would be to use c.i.f. unit values of imports.
- As already noted in the Panel Report, the product coverage of the Superfund tax extends beyond crude petroleum. This has implications for determining the injury. For example, if the goal is relatively precise estimates of the injury, estimates of, or assumptions about, the relevant price elasticities should be made for each individual product on which the tax is levied. Also, the increase in the ad valorem tariff equivalents caused by the tax differential will vary depending on the c.i.f. import prices and the existing specific duties on the individual products.¹
- To the extent that price elasticities of demand are involved, it is essential to use price elasticities of import demand rather than price elasticities of domestic demand.²

¹When a flat 3½¢ per barrel tax differential is applied to products for which the price per unit varies (for example, to crude petroleum and gasoline), the ad valorem equivalent will be lower for the more processed products than for the less processed products. In principle, this could induce foreign exporters to shift the product mix of their exports to the United States in the direction of a higher proportion of more processed petroleum products.

²The price elasticity of import demand will usually be larger - and can be substantially larger - than the price elasticity of domestic demand whenever imports account for less than 100 per cent of total domestic consumption.

27. Two final points concerning the injury estimates should be mentioned. First, beyond the short-term, the loss in producers' surplus will change depending on the general evolution of import volume.¹ For example, if import volume expands over time in response to economic growth in the United States, the loss in producers' surplus to the Community caused by the 3½¢ tax differential would also increase (and vice versa if a depletion of the Community's petroleum reserves led to a "natural" decline in exports). The evolution of import volume in the absence of the tax differential cannot be observed, of course, and it would be very difficult to estimate. Second, it bears emphasis that the actual development of import volume, on its own, yields no information about the impact of the Superfund tax differential on import volume. In particular, the continued growth of imports subject to the 3½¢ tax differential cannot be used to argue that the tax has no effect.

(C) CALCULATION OF EQUIVALENT RETALIATION

28. In estimating the injury-equivalent retaliation, basically the same issues as those discussed above emerge. Therefore, the calculations should also be based on one of the three options described above. The only difference is that under Option 2 the burden of proof for the availability of relevant elasticity estimates for the retaliating country's market would shift to the retaliating country. In principle, the estimates of the injury and of the injury-equivalent retaliation should be made on the basis of data for the same year.

29. In determining the tariff revenue resulting from the additional 2½ per cent tariff on imports of selected products from the United States, the Community implicitly applied Option 1, as it did in the injury calculation. Under Option 1, it is assumed that all of the additional tariff revenue is paid by the United States exporters, which means that it also measures the loss in producers' surplus of United States exporters. However, the calculations are based on trade data for 1987, rather than for 1986 or 1984-86, as was the case for the injury estimates. The Secretariat has verified the tariff data in Annex III, and the calculations in Part 2 of C/W/540/Add.1.

30. Two points should be noted, however. First, it is inherent in the situation that the envisaged retaliatory action would be discriminatory, whereas the Superfund tax differential is levied on an m.f.n. basis. In other words, the affected imports from the United States would be put at a disadvantage against supplies from all other sources, both inside and outside the Community. Second, the envisaged suspension of concessions involves an additional ad valorem duty, whereas the Superfund tax differential is a per unit tax. While the nominal margin of protection of the ad valorem duty is independent of future changes in import prices, the nominal margin of protection of the per unit tax - that is, its ad valorem equivalent - would increase (decrease) with falling (increasing) import prices.

¹This effect is distinct from the change in the loss of producers' surplus due to the shift from short-term to longer-term elasticities.

31. Finally, as in the case of the injury from the loss in producers' surplus due to the 3½¢ tax differential, the impact of the retaliatory measure on the producers' surplus (or export revenue) of United States firms will change as trade conditions change. If the target was to maintain a certain correspondence between the injury and the retaliatory measure over time, it would be necessary to recalculate the loss in producers' surplus from the retaliatory action year by year and adjust the retaliatory action accordingly.

IV. THE ISSUE OF APPROPRIATENESS

(A) INJURY ASSESSMENT

32. In view of the preceding observations, the Secretariat considers injury estimates based on any of the three options outlined above to be appropriate.

(B) RETALIATORY RESPONSE

33. As regards the estimation of the impact of a given retaliatory action, the Secretariat also considers any of the three options to be appropriate. There appears to be no particular advantage in insisting that the same option be used for the injury and retaliation estimates in any given case.

34. A final question concerns the appropriate relation between the amount of the injury and the amount of the retaliation (whether the assessments of these amounts are based on the loss in producers' surplus or the loss in export revenue). A basic point to note in this regard is that Article XXIII does not require that the two be equal.¹ The contracting parties may wish to consider what other factors to take into account in examining the appropriateness of the proposed retaliatory measure.

¹Article XXIII.2 includes the following statement: "If the CONTRACTING PARTIES consider that the circumstances are serious enough to justify such action, they may authorize a contracting party or parties to suspend the application to any other contracting party or parties of such concessions or other obligations under this Agreement as they determine to be appropriate in the circumstances."

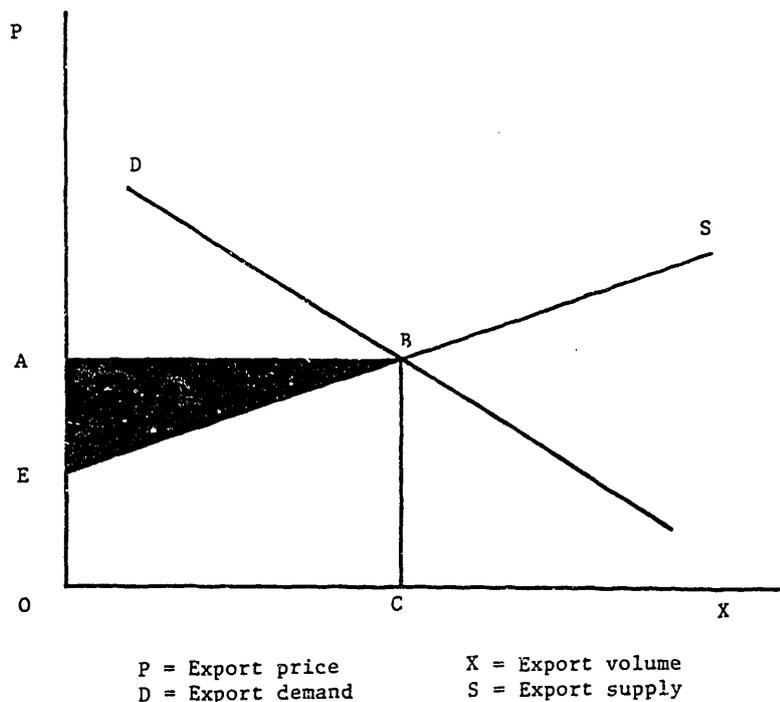
ANNEX

I. A GEOMETRIC EXPLANATION OF THE DISTINCTION BETWEEN
PRODUCERS' SURPLUS AND EXPORT REVENUE

35. Chart 1 portrays a hypothetical export market for crude petroleum. The export demand curve (D) is drawn with a downward slope to reflect the assumption that at a lower price per barrel, a larger quantity will be demanded. The export supply curve (S) has an upward slope, reflecting the assumption that the higher the price, the larger the quantity that will be offered for sale.

36. The volume of exports corresponds to OC or, say, 150,000 barrels. The price corresponds to OA or, say, \$16 per barrel. The total export revenue in Chart 1 is equal to the area ABCO, or \$2.4 million.

CHART 1

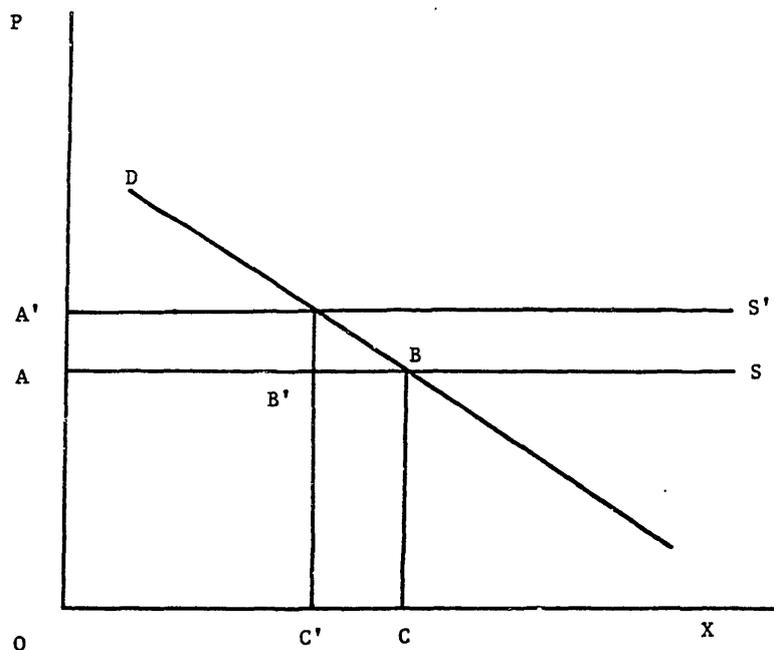


37. Producers' surplus is defined as total export revenue in excess of the total (social) cost of export production (this cost corresponds to the area OEBC). In Chart 1, producers' surplus is represented by the shaded area ABE. Since E marks the \$8 point on the price axis in this example, area ABE is equal to \$600,000, or one-quarter of the total revenue of \$2.4 million.

38. To put it somewhat differently, according to Chart 1 the land, labour and capital currently engaged in producing the 150,000 barrels of petroleum for export would be receiving a total of \$1.8 million if they were employed producing other products. The difference between the actual earnings and what they would collectively receive elsewhere (\$2.4 minus \$1.8 million) is their producers' surplus. If petroleum exports were cut-back by 150,000 barrels, the collective loss suffered by the factors of production (once they were re-employed elsewhere) would not be \$2.4 million, but rather \$600,000. This is the basis for the view that it is changes in producers' surplus, and not changes in export revenue, which are relevant for assessing injury to producers from changes in trade barriers (the same holds, of course, for assessing the benefits to producers from reductions in trade barriers on their products abroad).¹

39. It is clear from Chart 1 that the flatter the slope of the supply curve, the smaller the amount of producers' surplus. As is evident from Chart 2, if the export supply to the market in question is perfectly elastic at price OA, there is no producers' surplus.

CHART 2



¹These illustrative figures do not allow for the possibility that one or more of the factors of production would incur transitional adjustment costs in moving out of the petroleum industry and finding employment elsewhere in the economy. A full assessment of the injury to the exporting country would include these costs (if any). However, as was noted above, the empirical quantification of these costs would present very formidable difficulties.

40. For simplicity, the supply curve S in Chart 2 has been drawn horizontal throughout, implying that the supply to the market in question is always infinitely elastic at price OA, irrespective of the quantity demanded. In fact, all that is required for the analysis in this Note is that the supply is infinitely elastic over the range of price changes being considered. More generally, wherever supply elasticities enter the picture in this Note - whether at a conceptual level or in references to actual empirical work - the relevant elasticity values are those which apply over the range of price changes being considered. This general point also holds for all references to price elasticities of import demand in this Note.

41. A tax levied on imports will cause the export supply curve to the market in question to shift upward by the amount of the tax. In Chart 2, a tax equal to AA' causes the supply curve to shift from S to S'. If the demand elasticity lies between zero (perfectly inelastic) and infinity (perfectly elastic), the imposition of the tax will lead to a decline in the volume of exports to this market. In the example given in Chart 2, this is measured by CC'. The value of exports also declines, by an amount measured by area B'BCC'.

42. Although the elasticity of a demand or supply curve is not the same as its slope, there is a close relationship. Generally speaking, the flatter a curve is, the more elastic is the demand or supply it represents. Thus the link, stressed in the main text of this Note, between the elasticity of the export supply curve and the impact on producers' surplus of reductions in price.

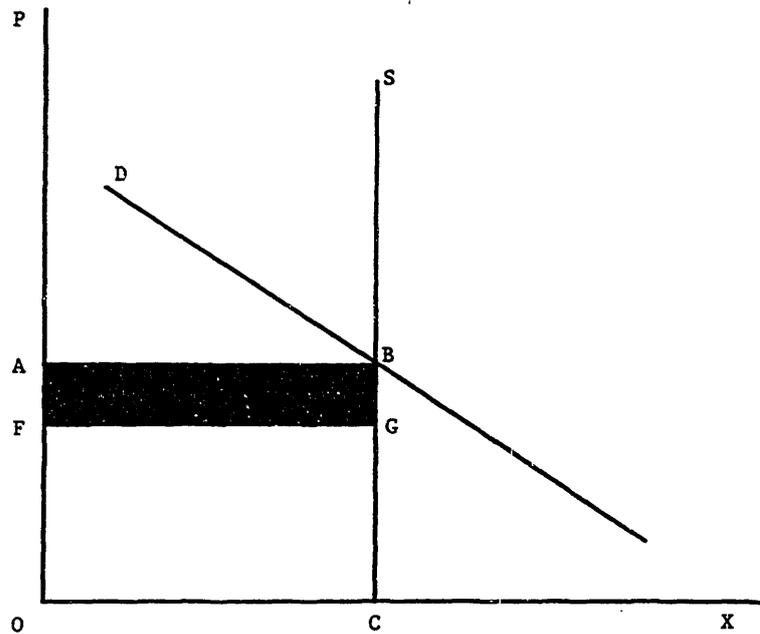
43. In interpreting the charts in this Annex, it should be kept in mind that they all have a time dimension. For example, OC in Chart 1 represents a 150,000 barrels of crude petroleum per time period (day, week or year). The loss in producers' surplus or in export revenue, therefore, is a loss per time period.

II. THE GEOMETRY OF THE THREE OPTIONS

(A) OPTION 1

44. The first option described in the main text of this Note involves assuming that the Community's exporters absorb the 3½¢ tax differential, that is, that the export supply elasticity is zero. This means that the Community exports the same volume as before, but receives 3½¢ per barrel less. This situation is illustrated in Chart 3. The loss in producers' surplus is represented by the shaded area ABGF (in terms of the Community's calculations for the Superfund tax differential, this area is equal to \$7.24 million per year).

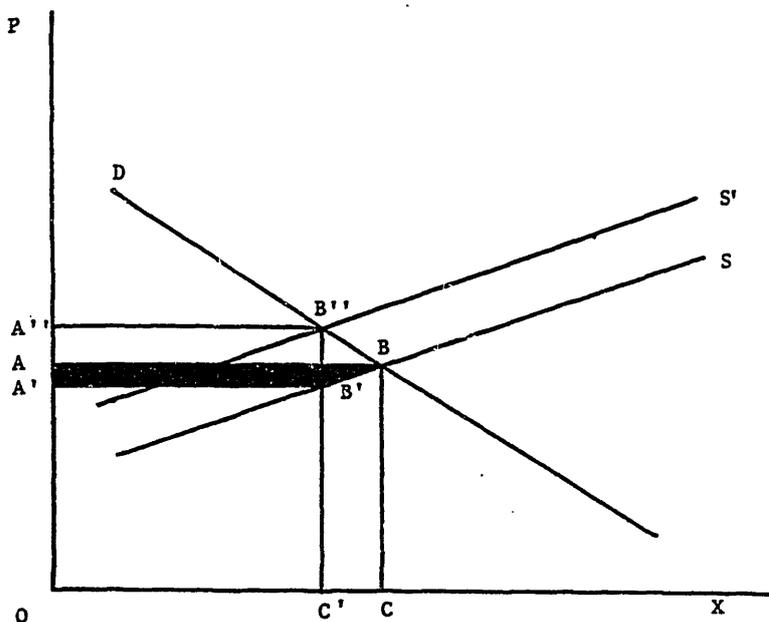
CHART 3



(B) OPTION 2

45. Chart 4 portrays the second option, in which the parties involved agree on the values of the price elasticities of export supply and import demand to be used in the calculations. From the viewpoint of importers in the United States, the Community's export supply curve shifts up by $3\frac{1}{2}\text{¢}$ per barrel. Part AA'' of the tax differential is passed on to United States consumers, while part AA' is absorbed by the Community's petroleum industry. CC' measures the decline in the volume of the Community's exports of petroleum.

CHART 4



46. The loss in export revenue for the Community is the sum of areas ABB'A' and B'BCC'. The former area (shaded) measures the loss in producers' surplus for the Community.

47. As may be seen from Chart 4, the flatter is the Community's export supply curve to the United States, (i) the smaller is the loss of producers' surplus, and (ii) the larger is the decline in the volume of exports to the United States. The steeper is the United States import demand curve for petroleum, (i) the smaller is the decline in producers' surplus, and (ii) the smaller is the decline in export volume. (At the limit, if the United States import demand curve is perfectly inelastic - that is, a vertical line - all of the 3½¢ per barrel tax is borne by United States consumers, and there is no impact on the Community's petroleum industry.)

(C) OPTION 3

48. The third option does not require a chart since it involves the parties to the dispute agreeing to a figure for the injury somewhere between zero and the figure yielded by the first option (which represents the maximum loss of producers' surplus).