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**DIRECT FEDERAL ACTION ON OIL IMPORTS:
AN ANALYSIS OF IMPORT FEES AND QUOTAS**

PREPARED BY THE
CONGRESSIONAL BUDGET OFFICE

AT THE REQUEST OF

HENRY M. JACKSON, *Chairman*
**COMMITTEE ON ENERGY AND
NATURAL RESOURCES
UNITED STATES SENATE**



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MEMORANDUM OF THE CHAIRMAN

To Members of the Senate Committee on Energy and Natural Resources:

The authority to impose oil import fees or quotas has been used by Presidents for the past 20 years. The exercise of this authority remains an option for President Carter in dealing with the Nation's growing dependence on high-cost oil imports.

The uncertainty of congressional action on the President's proposed crude oil equalization tax has led to renewed interest in the alternative of import fees or quotas. Accordingly, the Committee asked the Congressional Budget Office to prepare this analysis of the economic impacts and possible effectiveness of fees or quotas. The analysis makes clear that the economic impacts and regulatory costs of fees or quotas are not insignificant. While fees or quotas may prove necessary in the absence of further action to reduce imports, other alternatives may prove more effective.

This analysis deserves careful study by Congress and the Executive Branch. The Committee is grateful to the Congressional Budget Office for its cooperation in preparing this report.

HENRY M. JACKSON, *Chairman.*

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PREFACE

Crude oil import fees and quotas are presently being considered as alternatives to the proposed Crude Oil Equalization Tax to reduce oil imports. This report examines a number of issues related to these policies, such as, potential import reductions, the extent of price increases, and the impact of these proposals on the overall economy.

Direct Federal Action Against Oil Imports was written by Everett M. Ehrlich of CBO's Natural Resources and Commerce Division, under the general direction of Richard D. Morgenstern and Raymond C. Scheppach. Patricia H. Johnston edited the manuscript, which was typed for publication by Misi Lenci. The report was prepared at the request of the Senate Energy and Natural Resources Committee. In accordance with CBO's mandate to provide objective and nonpartisan analysis, this paper contains no recommendations.

Alice M. Rivlin
Director

June 1978

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SUMMARY

The proportion of foreign petroleum used by the United States has increased steadily over the past decade so that about 45 percent of U.S. crude and refined petroleum products is now imported. This total is likely to move about 50 percent by the early 1980s. This steady growth in the proportion of crude oil imported into the U.S. is a product of both ever increasing levels of demand and declining domestic production, caused, in part, by lower prices for domestic crude oil.

Under the current system, the price of domestically produced crude oil is fixed at a level of \$2/barrel (/bbl.) below the world market price of imported crude oil. So that this will not lead to a situation in which some refiners are in a much more advantageous position than others, a so called "entitlements system" attempts to reduce inequalities through a complex system of transfer payments among refiners. Refiners buying cheap domestic crude pay into a pool a per barrel fee that brings their total per barrel cost up to a predetermined average; buyers of expensive foreign crude receive a per barrel subsidy from the pool. The goal of this system, with some exceptions, is to equalize the cost per barrel of crude oil to all U.S. refiners.

Part of the National Energy Plan proposed by the Administration in 1977 is the elimination of this difference in domestic and imported oil prices, with the goals of energy conservation and reduced total payments for foreign petroleum. The crude oil equalization tax (COET) was proposed by the Administration and enacted by the House as a means of reaching these ends. Since the fate of COET is uncertain in the Congress, two alternative policies are now being considered—crude oil import fees and quotas.

Fees, Quotas, and COET

Each of these three policies is designed to curb crude oil use, and hence imports, and does so through the mechanism of a higher average price for crude oil. Although these policies may differ as to levels, it is possible to design them so that each produces equivalent price increases and equivalent oil savings, (for example, an import fee of \$3.09/bbl. in 1985 will raise prices as far as would COET in that year). Nevertheless, the three policies can be differentiated along the following lines:

- o A crude oil quota would directly curb oil imports. Both COET and import fees would reduce oil use, but would reduce imports by less than the total reduction in crude oil use. This is because of the effects of the entitlements system (see Appendix), and COET as well, which equalize the cost of crude to all refiners, leaving refiners, to a large extent, indifferent as to whether they use foreign or domestic oil.
- o COET, as opposed to both import fees and quotas, would eliminate the need for the entitlements system. This would occur because COET would raise the price to refiners of all crude oil to the world price. On the other hand, import quotas would represent a new regulatory and/or bureaucratic burden.
- o COET, in its present legislative form, contains provisions for the rebating of tax revenues. The disposition of revenues received from import fees or auction-type quotas is unclear, but would ultimately determine the redistributive pattern of higher energy prices.

It should be pointed out that, because it is the most widely discussed figure, a \$5 import fee was used in the illustrative calculations in this study. The \$5 fee has a larger price and conservation effect than does COET. The levels of the crude oil import quotas analyzed herein vary below and above the levels of energy savings created by import fees. None of these three policies—fees, quotas, or COET—are inherently better at conserving oil. The different levels of energy savings attributed to each are a product of the energy prices that would be attained under each policy.

Import Fees

The analysis of an assumed crude oil import fee of \$1/bbl. in 1978, \$3/bbl. in 1979, and \$5/bbl. in 1980 and thereafter coupled with an equivalent fee on imported refined products of \$2.20 in 1980, indicates the following:

- o Such a fee would produce energy savings of 400,000 barrels per day by 1985, (about 3.5 percent of imports) although this figure can be influenced by Congressional treatment of a corresponding fee for imported refined products.
- o Imposition of such an import fee would result in an increase of 5¢/gallon of gasoline. The fee would cause a 0.5 percent increase in the rate of inflation per year in 1978 through 1980.

Unemployment would rise by about 350,000-400,000, although this increase could be eliminated by rebating import fee revenues.

- o Imposition of an import fee would erase the economic advantage currently enjoyed by U.S. refiners. Maintenance of this advantage through a special fee on products carries with it certain economic effects, including the costs of higher average prices which would be paid by U.S. consumers for both domestic and imported products, and the continued protection of some relatively inefficient domestic refinery capacity. Congress must determine the extent to which it chooses to protect domestic refineries as well as the manner in which they will be protected, for example, either through special tax treatment or price protection. It should be noted that U.S. refiners face higher operating costs, in part because of environmental regulation, and it might be desirable to protect domestic refiners to the extent that they are penalized by these particular restrictions.
- o A crude oil import fee would generate revenues of \$110 billion by 1985. This estimate assumes an equivalent fee on imported refined products.
- o Unless specific steps are taken, a crude oil import fee would put upward pressure on the prices of Alaskan and stripper oils. Such increases would raise the price of crude oil further, and should they occur, energy savings could conceivably increase from the estimated 400,000 barrels per day to a range of 550,000-600,000 barrels per day. Price increases of Alaskan and stripper oils would result in a pretax windfall to producers of \$29 billion between 1978 and 1985.
- o Imposition of a crude oil import fee would have no more than a minor effect on the U.S. balance of payments, especially if fee revenues are rebated to the public (although existing law does not provide for rebates). Should all of the crude oil savings resulting from a \$5/bbl. import fee and corresponding product fee be translated into import reduction, then 1985 oil imports would be reduced by about \$3 billion, although in the absence of new policies that channel energy savings into import reductions a lower figure is more likely.

Import Quotas

Discussion of the imposition of import quotas has been tentative, since no specific scenario for implementation has been advanced. Quotas

can be exercised in one of two possible ways. One is the "market" type of quota, in which crude users in the United States would bid for the right to secure some portion of the crude allowed into the country. Alternatively, some or all of the crude allowed to enter the United States could be allocated in a "non-market" fashion by the government. This arrangement could be used together with regulation to prevent the price increases that would ordinarily result from contrived shortages of crude oil. There would be severe administrative difficulties in accomplishing this end, however, particularly should quotas be incorporated into the present price control system. Assuming that permits to import restricted crude oil are auctioned, this analysis determined that:

- o A quota designed to reduce imports by 3 percent in 1985 (344,000 barrels per day) would raise the average price of all crude to refiners by \$1.76/bbl. and the price of refined products by 4.5¢/gallon.
- o A quota designed to reduce imports by 5 percent in 1985 (572,000 barrels per day) would raise the average price of all crude to refiners by \$3.02/bbl. and the price of refined products by 8¢/gallon.
- o A quota designed to reduce imports by 1,000,000 barrels per day (about 8.5 percent reduction) would raise the average price of all crude to refiners by \$5.56/bbl. and the price of refined products by 14.5¢/gallon.

The amount of foreign petroleum used by the United States has increased steadily over the past decade to the point that about 45 percent of U.S. crude oil and refined products is now imported. This total is likely to increase above 50 percent by the early 1980s. This steady growth in the proportion of crude imported into the U.S. is a product of both ever-increasing levels of demand and declining domestic production. Some see this increasing reliance on foreign crude as a dangerous trend for the U.S. economy, resulting in large outflows of U.S. dollars and in a potentially unreliable source of crude oil that could undermine the stability of the U.S. economy. On the other hand, critics of this view point out that a large proportion of the petrodollars are returned to the U.S. in one form or another, and that other industrialized nations, notably West Germany and Japan, are more dependent on energy imports than is the U.S.

Under current law, the price of domestically produced crude oil is fixed at a level substantially below the world market price of crude oil. So that this will not lead to a situation in which some refiners are in a much more advantageous position than others, a so-called "entitlements system" attempts to reduce inequalities through a complex system of transfer payments among refiners. Refiners buying cheap domestic crude pay into a pool a per barrel fee that brings their total per barrel cost up to a predetermined average; buyers of expensive foreign crude receive a per barrel subsidy from the pool. The goal of this system, with some exceptions, is to equalize the cost per barrel of crude oil to all refiners.

The National Energy Plan (NEP) of 1977 was proposed by the Carter Administration to promote conservation and conversion to alternative fuels in order to reduce the level of imports. One part of the NEP was the crude oil equalization tax (COET). Crude oil is now regulated according to "tiers" defined by production levels in 1972. The average daily production rate of any oil well in 1972 is termed the "base production control level" of the well. Current production up to this level is termed "old oil," and receives a wellhead price of about \$5.29 per barrel (bbl.). Production in excess of this base production control level is assigned to the "new oil" tier, and receives a price of about \$11.81/bbl. These two tiers, along with special classifications for Alaskan oil and stripper oil, are averaged to form a domestic "composite" price for domestic crude oil, which is now about \$8.80/bbl. When the price of imports, transportation, brokerage, and handling costs are included,

the average price of all crude to the refiner becomes \$12.18. COET would tax the difference between the wellhead price of crude oil and the price of imported oil in order to promote conservation, and, in turn reduce imports. COET would thus set the price of domestic crude oil at its international "replacement level," and would do so without providing a windfall profit for all domestic oil producers.

The fate of this equalization tax in the Congress, however, is uncertain, and discussion is underway within the Administration to undertake some direct action against oil imports, either through the imposition of a fee on imported oil, or through the use of a quota. All three proposals are similar in that they raise the price of crude oil, inevitably bringing about reductions in the use of oil and its refined products. Import fees would push up the price of crude oil and cause a reduction in the rate of growth of petroleum consumption through either fuel substitution or conservation. The imposition of a quota would limit the amount of crude oil available at current prices. This would cause prices to rise, unless the market forces were circumvented by rationing or some other form of allocation. Thus, a fee or quota policy produces the benefit of reduced crude oil consumption (and hence, imports), to be weighed against the disadvantages of higher energy prices or the inefficiencies of non-market energy allocation (for example, long lines at gasoline stations).

Oil import fees and quotas differ in two fundamental respects: for one, quotas create uncertainty about how much import prices will increase, while creating certainty as to oil savings. Fees do the opposite: they present certain price increases, leaving the extent of conservation to be determined by the market. Yet their final impacts will most likely be similar in the long run, after the economy has adjusted to lowered crude usage. Secondly, quotas directly curb imports while fees curb total oil use, both imports and domestic. Thus, quotas are more effective than fees at reducing imports, per se.

These two policies differ from the imposition of COET in that both would retain the necessity for the entitlements system with its large bureaucratic burden and administrative complexity. Both fees and quotas would increase the average price of crude by raising the price of imports. COET would retain their classification, but by establishing a tax equal to the difference between the regulated price of each tier and the world oil price, would eliminate the necessity of assuring all refiners equal access to different tiers of crude. Under COET, the prices to the refiners of different "types" of oil would equalize. Under quotas, they would diverge. It should also be noted that only COET would have an impact on supply. As presently specified, however, similar supply incentives could be adopted by adminis-

trative ruling for any other plan. COET specified that oil discovered after April 1977 would receive the real equivalent of the world oil price in that month. This higher price should encourage more exploration and result in more production.

Finally, all three policies could have the same macroeconomic distributive effects. This would depend on the disposition of revenues collected by the government under each policy. While rebating of oil tax revenues has only been formally advocated with reference to COET, it could be accomplished under a "market-type" quota system as well, or under a system of import fees. From an equity point of view, this may be necessary, since petroleum use is positively correlated with income. In addition, petroleum usage for home heating varies considerably by region of the country.

CHAPTER II. EFFECTS OF IMPORT QUOTAS ON THE PETROLEUM MARKET

Because discussion of the possible imposition of a quota has been tentative, a precise description of how a quota would be imposed, and at what levels, is difficult to specify. Thus, it is impossible to predict the precise effects of a potential quota until it is made clear how much oil will be allowed to enter the U.S. and under what conditions.

By restricting the physical volume of oil entering the country, quotas create contrived shortages of crude. These shortages induce potential buyers of crude to bid up the price for the crude they will purchase, in order to secure the desired level of crude oil. Especially because of the capital-intensive nature of refineries, there would be strong incentives to use higher prices in order to attract scarce crude and maintain production levels. Moreover, any quota must be accompanied by quotas for imported refined products. In the absence of product restrictions, such imports would increase to replace the reduced supply of domestically refined products caused by scarce imported crude oil.

MARKET-TYPE QUOTAS

The upward pressure in price created by a quota can be resolved either by "market" or "non-market" types of quota implementation. The market type of quota is one in which the bidding process by crude oil purchasers is allowed to take place. Since, for all practical purposes, a large supply of oil is available at the present world price, a restriction on availability through a quota would force crude users to bid up the price of imported crude over the world price. The difference between the quota price and the world price would be tantamount to a "privilege fee," that is, a fee that represented the economic value of the privilege of importing crude oil despite the quota's imposed limitations. This fee, equal to the difference between the price of a barrel of oil to the user (less transportation and handling costs) and the revenues received for that same barrel by the producer, would be collected by the government.

Alternatively, the government could enforce a quota by instructing all crude oil importers to import a specified fraction of their previous year's volume. Under such an arrangement, however, the "privilege fee" would become a windfall to oil producers and importers.

One possible scenario would consist of having the government issue importing permits that would entitle the permit owner to import a given amount of crude oil. The sum of the barrels allowed under all permits issued would be the ceiling level of imports allowed under the quota, since all crude oil entering the country would require a permit. The government could auction all or some of these permits to potential crude buyers under a sealed bid arrangement, granting permits to those buyers offering the highest price until the available supply of permits was exhausted. Permit holders would then be free to make whatever arrangements they desired with crude sellers abroad for the quantities they would be permitted to import.

Alternative methods of implementing a quota could involve the government in the bargaining process with crude producers abroad (OPEC and other nations such as Mexico and Great Britain). Under this arrangement, the government would announce the total level of imports it would allow and then take bids from crude producing nations to fill that level. After signing contracts with foreign crude producers, the government would then auction off these contracts to domestic crude users, just as it auctioned off import permits in the first case. Such authority now exists under Sec. 456 of the Energy Policy and Conservation Act (EPCA) of 1975.

Presuming that the government employs a privilege fee system of quota implementation, the question arises as to what price level for crude could result for quotas aimed at different levels of import restriction. Should flows of crude be curtailed through a quota, the final price levels determined by the market would depend on crude users' (principally refiners) willingness to bid for scarce supplies. This willingness could vary for several reasons, among them the state of the economy and the competitive position of foreign refiners. Thus, any estimate of the impact of a quota on crude prices is subject to a high degree of uncertainty.

Preliminary results of this analysis are depicted in Table 1. A quota that would restrict imports by 5 percent in 1985 (equal to savings of 572,000 barrels per day), would force up the market price of crude oil in the United States by approximately \$3.02/bbl., the equivalent of a \$5.39/bbl. import fee. A lesser target, that of a 3 percent import reduction, (344,000 barrels per day in 1985), would result in an average price increase of \$1.76/bbl., the equivalent of a \$3.14/bbl. fee on imports in 1985. A greater target, that of an import reduction of 1 million barrels per day by 1985, (about 8.5 percent),

would result in an average price increase of \$5.56/bbl., the equivalent of a \$9.93 fee placed on each barrel of oil imported in 1985. ^{1/}

TABLE 1. AVERAGE 1985 CRUDE OIL PRICES IN THE UNITED STATES UNDER ALTERNATIVE SCENARIOS: IN 1985 DOLLARS PER BARREL

Scenario	Price
Present Policy	20.07
Quota	
3 Percent Import Reduction	21.83
5 Percent Import Reduction	23.09
8.5 Percent Import Reduction	25.63
World Price	22.21

NOTE: These prices were obtained by applying an elasticity of .2 to the base volumes of oil announced in the National Energy Plan. These prices would represent refiner acquisition costs in 1985. The world price stated assumes a nominal 5.5 percent increase in each year.

^{1/} Computation of the relationship between oil prices and quantities is complex, and results are subject to a great deal of uncertainty. Part of the analytical difficulty stems from the fact that, with the assumed indefinite continuation of EPCA pricing regulations, the price paid by consumers is expected to rise independently of any new fees or quotas imposed on oil. The figures presented in this paper are based on a demand elasticity estimate of .2 for petroleum. This is a midrange estimate of the sensitivity of the demand for petroleum to its prices. It should also be noted that in comparing fees to average price increases, each dollar that import prices rise implies \$0.56 (the proportion of imports in 1985) increase in the average price of oil.

A further question suggested by the imposition of import quotas is the effect of concomitant price increases on refined products. For the three hypothesized quota targets, 3 percent import reduction, 5 percent import reduction, and 8.5 percent import reduction, the average price of refined products will rise 4.5¢/gallon, 8¢/gallon, and 14.5¢/gallon, respectively, if U.S. refiners were able to pass along the full value of crude oil cost increases.

NON-MARKET TYPE QUOTAS

The alternative to market-based systems, in which restrictions on crude are allowed to be translated into higher prices, are non-market systems in which allocations of imported crude are determined by some form of administrative fiat as opposed to bidding by users. It is unclear what types of rules the government would promulgate, but a precedent exists in the mandatory crude oil allocation program, initiated in December 1973, to deal with the immediate consequences of the OPEC boycott. This scenario would depend on the use of an "allocation fraction," allowing each crude importer the same fraction of its prequota level of imports. In the case of a quota limiting imports by 10 percent, the allocation fraction would be nine-tenths.

Concurrently, it would be necessary to reimpose price controls and an allocation system on all refined products. Price controls would be needed to avoid profiteering by refiners, wholesalers, retailers, and/or end-users. An allocation system, including the establishment of a priority scheme, would be necessary to assume relatively equitable and efficient distribution of products like gasoline, distillate, residual oil, etc. A precedent for such action exists in the Emergency Petroleum Allocation Act (EPAA) of 1973.

CHAPTER III. THE EFFECTS OF AN IMPORT FEE ON THE DOMESTIC PETROLEUM MARKET

A wide variety of crude oil import fees can be constructed; the figures of \$5/bbl. and \$6/bbl. have been discussed. At the request of the Senate Energy Committee, this analysis concentrates on import fees, and addresses an import fee implemented according to the following schedule: \$1/bbl. in 1978, \$3/bbl. in 1979, and \$5/bbl. thereafter. Given these rates and anticipated crude flows, this analysis indicates that prices for crude will rise to levels slightly higher than those that would have been reached under the crude oil equalization tax (COET) by 1985. These results are presented in Table 2.

Because the \$5/bbl. import fee would push domestic prices above those forecast under COET, the reductions in consumption attributable to the import fee would be higher than those attributable to COET. Any estimate of final savings in crude oil consumption, however, will be sensitive to two critical assumptions: the elasticity of demand for crude oil, and the degree to which interaction between buyers and sellers of petroleum and its products allows the import fee to be passed through to consumers. This analysis estimates that the elasticity of demand for petroleum is in the range of .20-.22 for the time period extending to 1985, and that 85 percent of the fee will be passed through to final users. ^{1/}

It is also assumed that the composite price of domestic crude oil will rise by the full 10 percent allowed by the Energy Policy and Conservation Act (EPCA) of 1975. Variations on this assumption, however, will cause only minor decreases in any estimate of energy savings. Under these assumptions, decreases in crude oil consumption should occur at a rate of about 400,000 barrels per day by 1985. Should this total decrease be

^{1/} The percentage of passthrough, as will be discussed in a section below concerning refinery operations, is to some extent an outcome that Congress can determine by deciding on a fee level for imported refined products. The elasticity estimate is a mid-range estimate of the sensitivity of demand for petroleum to its price, but it should be noted that it is generally agreed that the demand for petroleum is less sensitive to price changes than the demand for most other goods.

TABLE 2. AVERAGE REFINER ACQUISITION COST OF CRUDE OIL
UNDER ALTERNATIVE POLICIES: BY CALENDAR YEARS,
IN CURRENT DOLLARS PER BARREL

Year	Present Policy	COET <u>a/</u>	Import Fee
1978	12.18	12.83	12.59
1979	13.08	14.41	13.34
1980	14.12	16.46	16.32
1981	15.17	17.37	17.42
1982	16.28	18.28	18.58
1983	17.50	19.27	19.90
1984	18.76	20.30	21.21
1985	20.07	21.26	22.52

NOTE: Projections of the quantities of oil that are classified in each tier were taken from a July 15, 1977 White House announcement entitled National Energy Plan: Oil and Gas Supply. The prices of each tier were extrapolated from an August 16, 1977 announcement on pricing policy published in the Federal Register. The world price assumed was taken from a base price of \$14.29/bbl. in 1977 and inflated by 5.5 percent/year. The volume of imports assumed was taken from the White House's NEP announcement of April 29, 1977.

a/ The COET proposal set forth in the National Energy Plan would work as follows:

- o In 1978, a tax of \$3.00 bbl. would be placed on all "old" oil;
- o In 1979, a tax that would bring all "old" oil to the "new" oil price level would be imposed, equal to \$7.08/bbl. in 1979 dollars, given CBO's projection; and
- o From 1980 on, a tax would be imposed on both old oil and new oil to bring their prices up to a level equal to that of "new-new" oil, or the world market price.

translated into import reduction, this measure would reduce crude oil imports by about 3.5 percent by 1985. Crude oil savings under different assumption are depicted in Table 3.

TABLE 3. 1985 CRUDE OIL SAVINGS RESULTING FROM IMPOSITION OF IMPORT FEE: IN THOUSANDS OF BARRELS PER DAY

Percentage of Import Fee Absorbed by Final Users	Sensitivity of Demand for Petroleum to Price		
	High (Elasticity = .25)	Midrange (Elasticity = .20)	Low (Elasticity = .17)
100 Percent (high estimate)	577	462	392
85 Percent (midrange estimate)	495	396 <u>a/</u>	337
70 Percent (low estimate)	411	329	279

a/ The estimate of 396,000 reflects the midrange of both assumptions.

It should also be noted that these results are similar to those discussed in the analysis of import quotas, as one would expect. Similarly, both fees and quotas are similar to COET—that is, they vary notably as to price level and resulting energy savings. Yet COET can be seen as preferable to both fees and quotas in that it eliminates much of the bureaucratic effects of the entitlements program by eliminating the need continually to recalculate entitlements obligations.

ALASKAN AND STRIPPER OILS

Although all import fees would be collected by the government, producer revenues may still increase, because some forms of oil that compete with imports, notably Alaskan and stripper, sell at an unregulated price or at a price below their allowable ceiling. To understand how such

price increases would come about, it is necessary to understand how the "entitlements" system of crude oil distribution operates.

The entitlements program attempts to reduce inequalities in the acquisition cost of crude oil to domestic refiners. It does so by entitling each refiner to an equal proportion of old-tier, new-tier, and imported crude oil. Thus, an "entitlement" (possession of which gives a refiner access to one barrel of "old" oil) has a cash value that reflects the lower cost of old crude to the refiner. At present, the price of an entitlement (which is equal to the price of imports, less a 21¢ landing fee, minus the price of old oil) is \$8.48, and the average entitlement benefit per barrel processed is \$1.95. The entitlements system is explained in detail in Appendix A.

In 1977, 40 percent of crude oil processed by domestic refiners was imported. Thus, should the cost to refiners of imported crude go up by a \$5/bbl. fee, then the average acquisition price for all oil would increase by $\$5.00 \times .40$, or \$2.00. This would also raise the value of an entitlement (the average saving per barrel of not using imports) from \$1.95 to \$3.95 per barrel, and would increase the savings realized by processing a barrel of old oil from \$8.48 to \$13.48.

The price of Alaskan oil is subject to two restrictions. First, the delivered price to refiners of Alaskan oil cannot exceed the world price because of the entitlements treatment they receive, and because of pressures of the competitive market. Second, the price of Alaskan oil at the wellhead cannot exceed the regulated price of new oil, currently \$11.42. This second condition, however, is redundant in practice, because pipeline and transportation costs that make up the difference between the wellhead and delivered prices are greater by several dollars than the difference between the price of new-tier oil and the world price. Thus, the wellhead price of Alaskan oil has been traditionally far below its allowable ceiling. Raising the allowable ceiling of delivered prices through the imposition of an import fee would facilitate an increase in the wellhead price, now \$5.32/bbl. Assuming a total shifting of the import fee, the price of Alaskan oil at the wellhead should rise to \$10.32/bbl., once the full \$5/bbl. fee is in place. This would result in a pretax windfall of \$15.3 billion to producers of Alaskan oil in the period 1978-1985, of which about one-fourth, or \$3.8 billion, would be paid to the State of Alaska in severance taxes. All of this, however, presumes that Alaskan oil will continue to get its present entitlements treatment, in which the buyer of Alaskan crude receives the price of an entitlement as a subsidy.

Stripper oil--oil produced from old wells yielding less than 10 bbl./day--is exempt from regulation under the terms of the EPCA (Section

8). At present, it earns approximately \$14.00 bbl. Assuming a total shifting of the import fee, it is reasonable to assume that the price of stripper oil would rise by \$5.00/bbl. This would result in increased (pretax) producer revenues of approximately \$14 billion between 1978-1985. Unlike Alaskan oil, however, where current production is constrained by the physical capacity of the pipeline, the price rise of stripper is likely to increase production somewhat.

Increases in the prices of stripper and Alaskan crude can be anticipated and thwarted by administrative action in the entitlements program. This could be done by assigning Alaskan and stripper crude to a separate tier with a price equal to the world price without the imposed fee. From CBO's preliminary investigation, it appears that creation of a fourth tier is administratively possible under existing statutes for Alaskan oil, but not for stripper, which has been expressly deregulated. Nevertheless, the price of stripper may be controlled indirectly, by removing the entitlement benefits it currently earns.

In order to keep stripper at its present price of approximately \$14/bbl. while imports rise to \$19/bbl. because of the import fee, an entitlements obligation of about \$5/bbl. could be established. This would imply paying about \$5/bbl. to the entitlements pool for every barrel of stripper processed. Thus, if imported oil sells at \$19/bbl., and if purchasing a barrel of stripper necessitates a \$5/bbl. gross payment to the entitlements pool, then a refiner would not offer a crude producer more than \$14/bbl. for stripper crude. Paying a producer \$16/bbl. for stripper, for example, would make the real cost of the barrel of stripper equal to \$21/bbl. (since \$5/bbl. would be paid to the entitlements pool), a cost at which stripper would be undercut by imports. Thus, the entitlements obligation set for a barrel of stripper can influence its price without statutory creation of a new tier. At this writing, it is unclear as to whether the government has the authority to set such an obligation for stripper, although it is likely that it does. If it does not, then no policy tools exist to prevent the import fee from creating a windfall profit for owners of stripper wells.

Should these price increases in stripper and Alaskan oils occur, then the windfall obtained by Alaskan oil stripper producers will raise the average price of crude oil and increase the estimate of energy savings to the range of 550-600,000 barrels per day. It should also be noted that, while higher prices for stripper oil may bring about some new production from stripper wells, some producing wells may be retired so that they can be reclassified as stripper. This would make the total supply effect of an import fee negligible. It is possible, however, that higher prices for Alaskan oil would encourage further exploration and development in Alaska. The likelihood of this, however, is impossible to estimate.

EFFECT ON REFINERY OPERATIONS

The effect of an import fee on refinery operations is conditional upon the treatment of imported products (crude oil derivatives). Since the average cost of all crude oil acquired by domestic refiners in 1985 will rise by \$2.45/bbl. in the event of a fee (\$5/bbl. fee x 49 percent, the proportion of all crude coming from imports in 1985), the price of refined products must rise by slightly more than 5¢/gallon to pass along these cost increases in full.

In the absence of a fee on imported products, the scale and competitiveness of the domestic refining sector could be affected. Without a fee placed on imported products, an increase in the average price of crude to refiners of \$2.45/bbl., (the 1985 impact) might jeopardize U.S. refineries' position vis a vis refineries in Europe and the Caribbean.

Until the introduction of the entitlements system in 1973, the world refining sector generally operated at about an 85 percent level of capacity utilization. When OPEC price increases occurred in 1973 and 1974, U.S. refineries were partially insulated from the full impact of these higher costs by the entitlements system. Because crude imports are subsidized more than product imports, 2/ U.S. refineries currently operate at a significant comparative advantage, illustrated by the present capacity utilization of U.S. refining (about 85 percent) compared to other refineries in the Western hemisphere and in Europe that export to the U.S. (about 60 percent). In the absence of an additional import fee on imported products, it is likely that the fee on crude oil alone would cause some shifting from U.S. refinery products to foreign ones. In South America and Western Europe, there is presently excess refinery capacity of over 3 billion bbl./year, about half of U.S. refining capacity. In addition, foreign refineries are generally given credit for having a pure competitive advantage because of lower operating costs and relative absence of environmental restrictions. If the domestic competitive advantage should cease, the potential for switching to imported products is considerable.

Moreover, as discussed earlier, the amount of a fee placed on imported products may play a pivotal role in determining the extent to which a crude

2/ The Administration has recently proposed, however, to give fully equivalent entitlements treatment to residual oil on the East Coast.

oil import fee is absorbed by domestic refineries or passed on to consumers. If a fee were imposed on crude oil, raising the price, most of this price increase would be borne by end-users of petroleum products. This passthrough is judged to be about 85 percent, reflecting the degree of dependency of the economy on petroleum. This estimate implies that refiners would have to absorb 15 percent of the fee, thereby lowering their profits. The final sharing of the fee between refiners and end-use consumers, however, would also depend on the price charged for imported refined products. If imported refined products were allowed to undercut domestic products (as they would if no fee were imposed), then refiners would be forced to absorb more than 15 percent of the fee. If imported products were forced to sell at a price higher than domestic products, then it is conceivable that all of the fee would be passed on to consumers. Thus, the fee set on imported products would affect the burden of the import fee in general and, in turn, final energy savings.

If the import fee on crude oil were imposed, it is not clear how large an import fee on refined products would be required to protect the American refinery industry from foreign competition. From CBO's survey of oil companies, estimates of the required fee on imported products range from a low of 42¢ per barrel to more than \$2.50 per barrel. In analyzing this issue, however, several points must be addressed:

- o The basic question is how much protection does the United States government want to provide for the refining industry. While part of the higher operating costs of U.S. refiners is clearly because of such factors as stricter environmental standards, some may be caused by inefficiency associated with older plant and equipment. Is it desirable to protect all these relatively inefficient operations?
- o There is a wide variation among domestic refiners in the degree of protection they need to remain competitive with foreign refineries. In general, location is key in determining a refiner's competitive position. Some domestic refiners, both independents and those owned by multinational oil companies, have a geographic advantage that more than offsets their higher operating costs.
- o CBO's survey of refiners indicates that generally the smaller, independent refiners need more protection than the larger ones owned by multinational oil companies. The entitlements system, however, already extends protection to small refiners through the "small refiners bias."

- o If some small, independent refiners were adversely affected by the fee on crude imports, the likely beneficiaries would be the foreign refiners who, in turn, are partly owned by U.S. multinational oil companies.

In sum, the size of the import fee, if any, that should be placed on refined products is a complex issue. It depends on the extent to which the U.S. government seeks to protect American refineries--particularly smaller, independent refineries. Some fees, however, will be necessary if U.S. refiners are to avoid losses.

ENERGY SAVINGS AND IMPORT REDUCTION

This analysis estimates the savings resulting from the imposition of an import fee of \$5/bbl. as amounting to 400,000 barrels of crude oil per day by 1985. Savings before the mid-1980s will probably be less than the 400,000 level, since reductions in crude oil use are more prone to take place in the long run, through replacement of energy-using devices, such as automobiles or boilers, with more efficient ones. This estimate assumes a tax equal to the increase in the price of crude to domestic refiners (about 5.7¢/gallon in 1980, and about 6.4¢/gallon in 1985), which is consistent with a passthrough of 85 percent as discussed above.

Although higher prices for crude oil inevitably translate into diminished use of crude, reduction in crude use need not translate one for one into reductions of imports, because of the effects of the entitlements system, discussed above. The entitlements system equalizes the acquisition cost of crude oil to refiners by granting each refiner access to the same proportion of oil from each regulatory tier, including the import category. By charging each refiner, in effect, the average cost of all crude, the refiner is virtually blind to the actual type of oil he uses. Thus, should a refiner cutback on crude purchases, it makes little difference to him whether he cuts back purchases of imported or domestic oil, although the entitlements program does have a slight built-in disadvantage for imports.

Certain circumstances mitigate this relative indifference. First, existing fees make imported crude oil 21¢/barrel more expensive to the refiner than domestic. Second, delivery systems and locational considerations make domestic crude oil easier to purchase. Thus, when conservation occurs, it is likely that, for every barrel of oil conserved,

somewhat more than 49 percent of that barrel of reduced oil consumption will come from imports. 3/

As discussed above, failing to impose an equivalent tariff on imported refined products could lead to a shifting away from U.S. refineries. This substitution would exacerbate the problem of flows of imported oil into the U.S.

3/ Forty-nine percent is the fraction of crude oil estimated to come from foreign sources by 1985.

CHAPTER IV. EFFECTS OF IMPORT FEES ON THE ECONOMY AND BALANCE OF TRADE

Aside from directly affecting the domestic petroleum market, an import fee would affect the entire national economy, because of the pivotal role of petroleum. Included in these effects is a measure of the regional impacts of higher oil prices. In this chapter, the repercussions of an import fee on growth, employment, price stability, and trade balance are discussed. Measures of regional effects of higher oil prices and reduced supplies are also analyzed.

MACROECONOMIC IMPACT

In order to gauge the impact on the economy of the proposed oil import fee discussed in Chapter III, CBO used a large econometric model of the U.S. economy to analyze the following four cases with respect to growth, employment, inflation, and balance of trade:

- o Base Case: Continuing present policy without the import fee.
- o Scenario I: Imposition of the import fee, with no compensatory policy.
- o Scenario II: Imposition of the import fee, with ensuing revenues disbursed through tax relief.
- o Scenario III: Imposition of the import fee, with ensuing revenues disbursed through tax relief, and compensatory monetary policy to prevent increases in interest rates.

The results of the analysis of these four scenarios are depicted in Table 4. As can be seen, the imposition of the import fee (Scenario I) decreases real GNP by 0.5 percent in 1979, and 1.2 percent in 1980, and raises the price level by about 0.5 percent in 1979 and 1980. Unemployment would rise by 0.2 percent in 1979 and 0.4 percent in 1980, a final difference of 380,000 jobs.

TABLE 4. SHORT-TERM MACROECONOMIC EFFECTS OF IMPORT FEES,
UNDER FOUR SCENARIOS, CALENDAR YEARS 1979 AND 1980

	Real GNP (billions of 1972 \$)		Unemployment Rate (percent)		Percent Change in GNP Deflator	
	1979	1980	1979	1980	1979	1980
Base Case	1456	1495	6.0	6.0	6.5	6.6
Scenario I	1447	1477	6.2	6.4	7.0	7.1
Scenario II	1454	1491	6.0	6.1	6.9	7.0
Scenario III	1454	1492	6.0	6.0	6.9	7.0

SOURCE: CBO computer simulation using the Wharton Econometric Forecasting Associates Quarterly Model of the U.S. Economy.

Thus, an import fee would have an identifiable, but not major, effect on the domestic economy. Some of these negative effects could be mitigated, however, through compensatory policies. One such policy would be to rebate the revenues to the public on a one for one basis which would require new legislation. As indicated in Table 4 (Scenario II), a reimbursement to the public of all import fee revenues helps to restore GNP and unemployment levels to those that would have been achieved without an import tariff. The price level, however, would be 0.4 percent higher.

An additional compensatory policy would be the use of monetary policy to offset potential increases in interest rates brought on by the second-round effects of increased spending resulting from reimbursement of tariff revenues. Such a policy, however, seems to have little marginal effect in increasing growth, or in decreasing unemployment or the price level. It should be pointed out that, while the recessionary effect of import fees and the stimulatory effects of compensating macroeconomic policies are felt quickly, the conservation effect discussed in preceding chapters, takes place over the longer term.

BALANCE OF TRADE AND POSITION OF THE DOLLAR

One of the principal goals of the proposed import fee is to reduce imports so as to correct the U.S. trade balance, which has deteriorated over the past decade for a variety of reasons, oil imports among them. It is CBO's view that other variables--such as cyclical fluctuations, economic development in the Third World, relative technological progress in the United States and abroad, and bureaucratic restrictions on trade--play a more pivotal role in determining the balance of payments than oil imports.

Higher prices for crude oil affect the economy in two separate ways. The first is a price effect--higher prices cause a direct reduction in oil imports, which decreases the aggregate level of imports, thereby improving the trade balance. The second effect is macroeconomic--higher crude prices slow economic activity generally, and historically, the level of all imports decreases when the economy slows down. Thus, higher crude oil prices reduce the level of imports by more than the amount of the ensuing reduction in crude oil use. (An effect running in the opposite direction consists of higher crude prices leading to an increase in domestic inflation, which in turn makes U.S. exports less competitive abroad, worsening the balance of trade.) These two effects do not occur simultaneously. The macroeconomic effect is felt much sooner, because higher energy prices force some firms to curtail or cease production while consumers are immediately faced with less discretionary income to spend on other goods and services. The price effect--conservation--takes a while longer to occur, because most reductions in energy use require time and new equipment to achieve--for example, fuel-saving cars, new coal-burning industrial boilers, etc.

The time factor of the two effects is important because there has been discussion of rebating the import fee revenues to the public through income tax or social security tax abatement. Such a rebate would counteract the recessionary macroeconomic effect of import fees, a policy that may be necessary to preserve adequate growth and employment. (As noted unemployment could rise by 380,000 by 1980 without a concomitant economic stimulus such as rebating import fee revenues.) However, such a macroeconomic stimulus could lead to an increased general level of imports as a consequence of renewed growth. Moreover, the increase in imports stemming from rebating import fee revenues may be as great as the reduction in imports obtained through the macroeconomic effect of imposing them, leaving the final position of the economy with respect to imports virtually unchanged. This was confirmed in model simulations.

TABLE 5. REVENUES TO FEDERAL GOVERNMENT: ALTERNATIVE FEE SCENARIOS

Year	Estimated Quantity of Imported Crude (millions barrels/day) (1)	Imported Crude Fee Schedule (current \$/barrel) (2)	Subtotal: Crude Fee Revenues (millions current \$/day) (3)	Estimated Quantity of Imported Refined Products (million barrels/day) (4)	Equivalence Fee Schedule for Imported Refined Products (current \$/bbl.) (5)	Subtotal: Imported Products Equivalence Fee Revenues (millions current \$/year) (6)
1978	6.164	1.00	2,250	2.046	.45	336
1979	6.493	3.00	7,110	2.165	1.38	1,091
1980	6.863	5.00	12,523	2,288	2.40	2,004
1981	7.192	5.00	13,125	2.397	2.46	2,152
1982	7.541	5.00	13,762	3.514	2.51	2,303
1983	7.890	5.00	14,399	2.631	2.62	2,516
1984	8.240	5.00	15,038	2.746	2.68	2,686
1985	8.589	5.00	15,675	2.863	2.68	2,801
Total			93,884			5,889

(Continued)

TABLE 5. (Continued)

Year	Total (3+6) (millions current \$) (7)	Minimum Protection Fee Schedule for Refined Products (current \$/ barrel) (8)	Subtotal Imported Products Minimum Protection Fee Revenues (4X8) (millions current \$) (9)	Total (3+9) (millions current \$) (10)	Crude oil Equalization Tax Revenues (millions/ current \$) (11)
1978	2,586	.84	627	2,877	3,830
1979	8,201	.87	687	7,797	8,316
1980	14,529	.93	777	13,991	15,077
1981	15,277	.99	866	13,991	14,837
1982	16,065	1.04	954	14,716	14,369
1983	16,915	1.10	1,056	15,455	13,842
1984	17,724	1.16	1,163	16,201	13,355
1985	16,476	1.22	1,275	16,900	12,959
Total	109,773		7,405	101,239	96,583

Thus the impact on the trade balance will be problematic for the first few years of the existence of the import fee. During this period, the redistributive and stimulative effect of rebating import fee revenues may increase all imports before reductions in actual crude oil imports occur. Inevitably, however, conservation induced by the import fee should override the stimulative effect and reduce total imports, although the ultimate improvement in the U.S. balance of payments position by 1985 will likely be minor, more so if the fee is rebated. In 1985, the fee would reduce oil imports by \$3 billion if all induced conservation is translated into import reductions. In the absence of new policy, this figure will be less.

REVENUE EFFECTS

The revenues that would be raised by a crude oil import fee are depicted in Table 5. Any estimate of these revenues depends on the treatment of imported refined products, discussed above. Two different assumptions were made to develop revenue estimates. First, it was assumed that products would be subject to a fee that was equal to the average increase in crude oil costs to the domestic refiner under an imported crude oil fee. This estimate is presented in column (6) of Table 5. Such a set of fees produces revenues of approximately \$110 billion between 1978 and 1985. An alternative assumption is that products would be charged a fee that provides only minimum protection to domestic refineries. Such a fee would be equivalent, corrected for inflation, to 84¢/barrel in 1978 dollars. This set of fees produces revenues of approximately \$101 billion between 1978 and 1985. For comparative purposes, COET revenues during this period are estimated to be about \$96.5 billion.

GEOGRAPHIC DISTRIBUTION OF THE BURDEN

Aside from its uses in the internal combustion engine and petrochemicals, petroleum affects the economy through its use as a heating fuel, and as the prime source of steam in electric power generation. This impact is felt to varying extents by the different geographic regions of the country. Petroleum is the principal heating fuel and source of electrical generation (in the forms of distillate and residual oils) for New England, New York, and New Jersey, and is used on the West Coast as the primary source of home heating. (Elsewhere in the United States, electricity is generated from coal, except in the natural gas producing regions of the south-central states. Nuclear power makes a strong secondary contribution in New England and California.) Because petroleum's use as a heating or generating fuel is regionally confined, any rise in the composite (average) price of crude oil would have an identifiable regional impact, as shown in Table 6.

TABLE 6. EFFECTS OF \$5 PER BARREL IMPORT FEE ON RESIDENTIAL HEATING COSTS

Department of Energy Region	\$/MMBTU a/ (No Fee)	\$/MMBTU a/ (\$5 bbl. Fee)	Percent Increase
New England (Me., N.H., Ver., Mass., Conn., R.I.)	5.59	6.06	8.5
New York/New Jersey	5.35	5.74	7.3
Mid Atlantic (Penn., Md., Del., D.C., Va., West Va.)	5.11	5.30	3.6
South Atlantic (Ky., Tenn., N.C., S.C., Ga., Ala., Miss., Fla.)	5.34	5.46	2.4
Midwest (Ohio, Mich., Ind., Ill., Wisc., Minn.,)	3.88	3.98	2.8
Southwest (La., Ark., Okl., Tex., N. Mexico)	4.27	4.31	1.0
Central (Mo., Iowa, Kan., Neb.)	3.73	3.79	1.5
North Central (N. Dak., S. Dak., Mont., Wyo., Col., Utah)	3.30	3.37	2.0
West (Arix., Nev., Cal., Hawaii)	4.26	4.35	2.1
Northwest	3.52	3.65	3.9

a/ Average cost of one million BTUs.

The cost to the consumer of one million BTUs—heat equivalent to that contained in a thousand cubic feet of natural gas, or enough to heat the average home for a day and a half in January—is depicted in Table 6 with and without the import fee for each of the ten regions of the country, as defined by the Department of Energy (DOE). 1/ The effect of an import fee was calculated by adding the full \$5/bbl. fee into the composite price of all crude oil. The composition of fuels used to generate heat is depicted by region in Table 7.

To demonstrate the effects of the price increases depicted in Table 6, the annual home heating bills for selected cities are presented in Table 8. The East Coast generally pays more per unit of energy, although colder areas, such as the Midwest, pay higher total heating bills. The bills calculated are for a 1,200 square foot ranch house with heavy insulation, using a heating efficiency figure of 85 percent for oil, gas, and coal furnaces and 100 percent for electric-resistance heating. Each of these is an optimistic assumption, and hence, the estimated bills are low. Moreover, as the marginal cost of heating oil rises, the prices of alternative fuels, such as coal or intrastate gas may rise. This effect was not computed nor included in the analysis, but could prove significant if sympathetic upward price movements occurred in coal, natural gas, and uranium.

1/ The relative contributions of different fuel sources toward residential heating were obtained from the Project Independence Evaluation System Model, prepared by their Task Force.

TABLE 7. COMPOSITION OF HOME HEATING FUELS BY REGION:
IN PERCENTS

DOE REGION	Electricity	Distillate Oil	Liquified Gas	Coal	Natural Gas
New England (Me., N.H., Ver., Mass., Conn., R.I.)	14	60	03	00	23
New York/New Jersey	12	48	01	00	39
Mid Atlantic (Penn., Md., Del., D.C., Va., West Va.)	20	29	02	03	46
South Atlantic (Ky., Tenn., N.C., S.C., Ga., Ala., Miss., Fla.)	41	15	10	01	32
Midwest (Ohio, Mich., Ind., Ill., Wisc., Minn.,)	14	18	06	02	60
Southwest (La., Ark., Okl., Tex., N. Mexico)	26	07	12	00	55
Central (Mo., Iowa, Kan., Neb.)	16	09	15	00	60
North Central (N. Dak., S. Dak., Mont., Wyo., Col., Utah)	14	10	10	01	65
West (Ariz., Nev., Cal., Hawaii)	20	02	02	00	76
Northwest	45	21	02	01	31

Source: Project Independence Energy Sector Model.

**TABLE 8. EFFECTS OF \$5 PER BARREL IMPORT FEE ON ANNUAL
HOME HEATING COSTS FOR SELECTED CITIES, 1978:
IN DOLLARS**

City	Without Fee	With Fee
Atlanta	56.91	58.19
Boston	121.66	230.55
Charleston, S.C.	44.59	45.59
Chicago	15.28	154.16
Detroit	165.89	170.17
Minneapolis	248.40	254.80
New York	161.74	172.19
St. Louis	111.47	113.26
Salt Lake City	124.79	127.43
San Francisco	22.75	23.22
Seattle	91.28	94.65
Washington, D.C.	116.13	120.45

APPENDIX

APPENDIX A. HOW THE ENTITLEMENTS SYSTEM WORKS

Crude oil is sold in the U.S. at a wide array of prices, because of a complicated system of price regulations and entitlement benefits. Imported crude oil is delivered to refineries at an average price of about \$14.40 per barrel (/bbl.). Crude oil produced in the U.S. is classified by "tier," and each tier is allowed a different price. "Old" oil, that is, oil produced from wells that were in operation before 1972, is grouped in a "lower tier," and is delivered to refineries at an average price of about \$5.70/bbl. "New" oil, that is, oil produced from fields that have commenced production since 1972, is classified as "upper tier," and is allowed a price of \$12.25/bbl. Other types of domestic crude oil--Alaskan and stripper (oil from wells that produce 10 bbl./day or less)--are allowed rough equivalence to the price paid at the refinery gate for imported petroleum.

When the tier-system of price controls on crude oil was instituted under the Phase IV Regulatory Program in 1972, ^{1/} it became clear that major integrated producers/refiners had an advantage over smaller, independent refiners, because of their greater access to old oil. A refiner processing old crude priced at \$5.50/bbl., when compared to a refiner processing imported crude at \$14.50/bbl., has a competitive edge equal to \$23/gallon. Such an advantage could be eliminated by entitling each refiner to an equal percentage of old, new, and imported oil.

This was accomplished through the implementation of the entitlements system under the Energy Production and Allocation Act. An entitlement is the right to refine one barrel of old oil in a particular month. Refiners, therefore, must possess a quantity of entitlements each month equal to the amount of old oil they will process. The number of entitlements they will be issued by Department of Energy is based on a proportion of their total volume of crude, that proportion being equal to the percentage of all crude that is classified as lower tier, or old oil. For example, as of June 1978, about 22 percent of all oil processed by refiners is old oil. Thus, a refiner

^{1/} This was the fourth, and final stage of the Nixon Administration's economic program to control inflation.

who processes 1,000,000 barrels per month will receive 220,000 entitlements. If the refiner in this example wished to process 230,000 barrels of old oil, he would have to find and purchase an additional 10,000 entitlements. If the refiner only had 200,000 barrels of old oil to process, he could sell his 20,000 extra entitlements to a refiner with excess old crude. Under this system, the value of an entitlement becomes equal to the difference in price between old oil and imports, since this difference is equal to the savings the refiner experiences by processing old oil instead of imports.

Thus, because they can be bought and sold, entitlements equalize the cost of the average barrel of crude oil processed by each refiner. Refiners processing more old crude oil than the national average must pay refiners processing less than the national average for their extra entitlements, thus eliminating the advantage created by processing more old crude than one's competitor. Moreover, this equalization is achieved on paper through the sale and purchase of entitlements through a common "entitlements pool," as opposed to the physical movement of different types of oil.

In 1975, the Energy Policy and Conservation Act modified the entitlements procedure. This was necessary because the world price had risen above the price allowed for new oil. Since there is now a \$2.15/bbl. price difference to the refiner between new oil and imported oil (\$12.25/bbl. vs. \$14.40/bbl.) and a \$8.50/bbl. difference between old oil and imports (\$5.70/bbl. vs. \$14.40/bbl. minus present 21¢/bbl. import fee), it has been determined that processing a barrel of new oil would require possession of 23 percent (\$14.40 minus \$12.25 minus the percent import fee of \$.21, divided by \$8.50) of an entitlement. Extra entitlements have been issued to all refiners so as to distribute equitably among them the cost advantages of both upper- and lower-tier oil over imported oil.

Table A-1 contains various examples of entitlements calculations corresponding to different possible treatment of Alaskan and stripper oil as described in Chapter III.

TABLE A-1. ENTITLEMENTS CALCULATION EXAMPLES

Type of Oil	Volume (millions of bbl./day)	Refinery Acquisition Cost (dollars)	Entitlement Price (dollars)	Entitlement or Credit (dollars)	Nationwide Adjusted Refinery Cost (dollars)
<u>Case 1 (Present Policy)</u>					
Lower	3.35	5.70	8.50	(2.20) <u>a/</u>	12.00
Upper	2.85	12.25	1.95	(2.20)	12.00
Stripper	1.05	14.40	0	(2.20)	12.20
Alaskan	1.10	14.40	0	(2.20)	12.20
Imports	<u>6.85</u>	<u>14.40</u>	<u>0</u>	<u>(2.20)</u>	<u>12.20</u>
Total	15.20				
<u>Case 2 (\$5 Import Fee but Hold Alaskan and Stripper Down)</u>					
Lower	3.35	5.70	13.50	(4.95) <u>b/</u>	14.25
Upper	2.85	12.25	6.95	(4.95)	14.25
Stripper	1.05	14.40	4.80	(4.95)	14.25
Alaskan	1.10	14.40	4.80	(4.95)	14.25
Imports	<u>6.85</u>	<u>19.40</u>	<u>0</u>	<u>(4.95)</u>	<u>14.45</u>
Total	15.20				
<u>Case 3 (\$5 Import Fee and Allow Alaskan and Stripper to Rise)</u>					
Lower	3.35	5.70	13.50	(4.95) <u>c/</u>	14.95
Upper	2.85	12.25	6.95	(4.25)	14.95
Stripper	1.05	19.40	0	(4.25)	15.15
Alaskan	1.10	19.40	0	(4.25)	15.15
Imports	<u>6.85</u>	<u>19.40</u>	<u>0</u>	<u>(4.25)</u>	<u>15.15</u>
Total	15.20				

General Notes to Table A-1 appear on the next page.

a/ $14.40 - 5.70 - .21 = \$8.50$

$$\frac{3.35 + .23 (2.85)}{15.20} \times 8.50 = 2.20$$

b/ $19.40 - 5.70 - .21 = \$13.50$; $19.40 - 14.40 - .21 = \$4.00$; $19.40 - 12.25 - .21 = \$6.95$

$$\frac{(3.35) + .51 (2.85) + .36 (2.15)}{15.20} \times 13.50 = 4.95$$

c/ $\frac{3.35 + .51 (2.85)}{15.20} \times 13.50 = 4.25$

NOTES TO TABLE A-1.

Nationwide Adjusted Refinery Cost = Refinery Acquisition Cost + Entitlement Price.

The entitlement price (\$8.50 or \$13.50 in these examples) represents the exact differential, as reported for a given month, between the weighted average per barrel costs to refiners of lower tier oil and of imported crude oil, less the sum of 21 cents. $\$14.40 - \$5.70 - .21 = \$8.50$.

In order to determine the entitlement credit, it is first necessary to calculate the "entitlement fraction." An entitlement fraction is associated with each barrel of upper-tier crude oil. Adoption of the three-tier price system in February 1976 made it necessary to assign a fractional entitlement to upper-tier oil in order to equalize it with imported crude oil. For any given month, the upper-tier fraction can be derived as follows: divide (the weighted average cost of imported crude oil, minus the weighted average cost of upper tier crude oil; minus 21¢) by the entitlement price. $(\$14.40 - 12.25 - .21) \div 8.50 = .23$. If there are more than three tiers of prices, then there will be more than one entitlement fractions. The entitlement credit can be calculated as follows: entitlement price multiplied by the domestic oil supply ratio (DOSR). The DOSR is roughly equal to the percentage of old oil in total refinery runs. In the actual calculation, the amount of old oil is adjusted upward to account for the existence of the controlled upper tier or tiers using the entitlement fractions. The result is deemed old oil, which is equal to the volume of old oil plus the volume of upper tier multiplied by the entitlement fraction. The numbers are further adjusted to account for feedstock entitlements, residual fuel entitlements, the small refiner bias, and any special hardship exceptions. $\text{DOSR} = (\text{deemed old oil minus bias and exceptions}) \text{ minus } (\text{refinery runs} + \text{residual entitlements})$.

The entitlements program includes a fixed disadvantage of 21¢ per barrel for imported crude oil. This is done in order to preserve an incentive for refiners to purchase domestic crude oil. Because stripper oil is treated as uncontrolled oil, it has the same 21¢ cost penalty as foreign crude.

Note that the above table is presented from the viewpoint of a marginal barrel of crude oil and the net entitlement position of that barrel. To determine the entitlement position of a particular refiner one would calculate a weighted average based on the proportions of crude types being run by that refiner, multiplied by the net entitlement position per barrel. The per barrel net positions shown in Table A-1 are:

Old oil : \$8.50 - \$2.20 = \$6.30 (Buy)
New: \$1.95 - \$2.20 = \$0.25 (Sell)
Import: 0 - \$2.20 = \$2.20 (Sell)
Stripper: 0 - \$2.20 = \$2.20 (Sell)



