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AND CURRENT ENERGY PROBLEMS

Santiago, Chile, 23-27 September 1974

LATIN AMERICA AND THE CURRENT ENERGY PROBLEMS

74-8-1614

NOTE

Tables 13, 25, 27, 28, 29, 30, 31, 32, 33, 34 and 35 were prepared by ECLA on the basis of preliminary estimates by the International Bank for Reconstruction and Development or the International Monetary Fund. It is hoped to provide participants with updated versions of these tables in the course of the Symposium.

CONTENTS

Note by the secretariat

At the Eighth Extraordinary Session of the Committee of the Whole, held in New York on 24 and 25 January 1974, the delegations of the States members of the Economic Commission for Latin America (ECLA) approved by consensus the following conclusions:*

1. There was full recognition of the concern of Governments regarding the energy crisis and its impact on the economies of the countries of the region.

2. It was recognized that the experience of the ECLA secretariat in the field of energy resources could be particularly useful. Accordingly, the desire was expressed that the secretariat should intensify its efforts in this field with a view to submitting to member Governments, as soon as possible, its observations and conclusions concerning the impact of the energy crisis on the economies of the region.

3. The Office of the Executive Secretary was invited to co-operate closely with the Latin American Energy Organization (OLADE) with a view to their assisting each other in the discharge of their respective tasks.

4. It was noted that for this purpose the Executive Secretary should be empowered to carry out the technical analyses in whatever manner and with whatever advisory services he might consider appropriate in order to bring the results before Member Governments for their consideration.

In pursuance of these aims, the secretariat undertook the preparation of a general study on Latin America and the current energy problems (especially those regarding petroleum supplies), together with other studies aimed at an in-depth investigation of some particular aspects, such as those related to the electricity industry, transport, fertilizers, and new investment requirements, and commissioned a consultant to prepare a review of the prospects for coal in Latin America.

* Economic Commission for Latin America, Committee of the Whole, Report on the Eighth Extraordinary Session, (24 and 25 January, 1974), Official Records of the Economic and Social Council, Fifty-seventh Session, Supplement No. 7A.

/As these

As these studies progressed, the need became apparent for an exchange of experiences at the technical level with experts working in this field in the countries of the region and with specialized technical experts from other international agencies.

The secretariat of the Commission, with the Latin American Institute for Economic and Social Planning (ILPES) as joint sponsor, has therefore convened a technical symposium to examine the repercussions of the current energy situation in the countries of Latin America(Santiago, Chile, 23-27 September 1974).

The present study, which is the central working document presented for the consideration of participants in the Symposium, will be improved and enriched with the commentaries and information presented by the participants.

It is worth emphasizing that the events which have occurred in energy economics since 1970 are so important and have been taking place so rapidly that the present situation is one of great fluidity and dynamism. Consequently, it is to be expected that some of the points analysed in the present document may be overtaken by events in the near future.

/Introduction

Introduction

The pervasive concern over the world energy crisis is particularly acute in Latin America today, a region which in 1973, contained nineteen net oil importing countries and five net oil exporting countries. Governments in both groups of countries are now facing hard decisions triggered by recent increases in the price of internationally traded crude oil.

The objective of the ECLA/ILPES-sponsored Symposium on Latin America and Current Energy Problems is to provide a forum for a discussion of this subject by technical experts from Latin American countries. With this context, this paper is intended to provide a general treatment of the three basic questions that constitute the Symposium's agenda:

(a) What is the "world energy crisis"?

(b) What are its immediate economic and financial implications for Latin American economies?

(c) What options are open to Latin American economies for confronting these implications?

The first chapter explores the nature of the world energy crisis. Seven conceptions of that crisis are identified and evaluated. This discussion leads to the fundamental conclusion that the key issue in this field which confronts Latin American countries today is the price of internationally traded crude oil. The chapter concludes with a brief discussion of the Latin American and world oil markets, a statement of the record of world crude oil prices since the late fifties, and an indication of the basic forces underlying that record.

The second chapter explores the immediate economic and financial ramifications for Latin American economies of a world crude oil price structure based on the assumption that the market price of imported crude oilñlies in the range of US$ 7.00-US$ 10.00/barrel, FOB Persian Gulf. Particular, but not exclusive, attention is focused on these effects as they impact the economies of the region's oil-deficit countries.

/This analysis

This analysis leads to two basic conclusions: first, the threat to output and employment in Latin America's oil-deficit countries operating through the balance of payments of individual countries, and in the aggregate, through international liquidity, is both dire and immediate; and, second, if it is to be avoided, this threat to output and employment requires inter alia, the immediate creation of new international monetary arrangements for channelling the surplus funds of the major oil-exporting countries to the developed and developing economies. This transfer of funds is of particular strategic importance for the developing countries. On a broader scale, failure to forge such international financial arrangements could induce a severe worldwide recession in the near future.

The analysis presented in Chapter II is generalized in the sense that, while reference is repeatedly drawn, to specific Latin American country impacts, it focuses on the effects that the energy crisis will have on key macroeconomic variables: domestic prices, production, and employment, and the balance of payments; and, on international financial stability.

This general orientation is defensible on two grounds: first, it is simply not feasible, for present purposes, to conduct twenty-four separate Latin American country impact studies; and second, crude oil dominates the energy base of every country in the region, and, with due respect to its critical nature, the direct and near-term effects of a change in its price can be approached using the same techniques for analyzing the basic consequence of a change in the price of any other resource input.

The final chapter in this paper explores the policy options open to Latin American (and implicitly all other) oil-importing countries for confronting the higher level of their energy prices triggered by increase in the cost of their crude oil imports since 1970, and, particularly, from late 1973 to-date.

It begins with a documentation of the obvious: each Latin American country is economically unique, and the aggregate of these countries is not the geographic unit on which to focus a meaningful discussion of policy options; each country must be approached separately in terms of policy analysis.

Additionally, despite its obvious importance, this discussion of policy-options does not treat in detail the broad, macroeconomic problems triggered by the continuance of the new level of energy costs: the problem of domestic price levels, production, employment, domestic balance of payments, and international financial stability: to do so would explode the scope of this paper to gargantuan and misplaced proportions. Rather, the discussion of policy options focuses on a narrower field: how each Latin American oil-deficit country can consider now acting in a potentially positive way on the heart of the problem: the price and foreign exchange commitments for imported crude oil supplies. The discussion of policy options is divided into two classes of action: one focuses on decreasing the demand for imported crude oil, and the other focuses on decreasing the supply cost of imported crude oil.

The supporting papers commissioned for the Symposium are intended to supplement the general analysis presented in this paper. These papers are of two kinds. The first explores, in greater detail, the immediate industry-impacts of the "energy crisis". This set of papers contains impact analyses for Latin America's petrochemical, fertilizer, transportation, electric power and coal industries and its agricultural sector.

The second set of papers contains a more detailed examination of certain key problems raised by the continuance of the new level of world crude oil prices. Topics under this rubric include the impact of these prices on changes in the level of domestic investment requirements, on the financing of capital imports, and on the pattern of international trade and liquidity. Another paper in this group places recent trends in crude oil prices in the broader context of recent changes in basic commodity prices. There is another paper which examines the longer-run prospects for patterns of world energy supply, and a final paper examines the subject of Latin America's petroleum resources.

/The focus

The focus of this paper and the supporting papers as well is on the immediate future (1974-1980) in line with the same orientation of the Symposium. This is not meant to slight the longer-run ramifications of the energy crisis. Clearly, if the new trend in world oil prices continues, those effects will be immense. These longer-run impacts might be covered specifically in a second ECLA-Symposium on the Energy Crisis.

In short, the focus of the Symposium, this paper, and the supporting papers is modest in nature, but, hopefully, an efficient vehicle for progress. The overall objectives are: to define the problem clearly; to spell out its major near-term implications; and to stimulate discussion on what Latin American countries can do now to deal with the problem.

/Chapter I

Chapter I

THE PROBLEM: ITS WHYS AND WHEREFORES

A. DEFINING THE PROBLEM

1. Seven concepts of the world energy crisis

Whether the analyst proceeds from the label "energy crisis" to a search for its real-world referent, or whether he proceeds from a fiat definition of the problem, one thing is clear: different people have different concepts of the energy crisis in mind when they discuss it. For this reason, if no other, when approaching an analysis of the subject, it is necessary, in the beginning, to be clear about what one means when he uses that term.

What, then, are the various conceptions of the problem; and what is the defensibility of each when subjected to critical evaluation?

There are seven widely held conceptions of the energy crisis. They are the following:

1. It is a physical shortage of world energy reserves, imminent within a time horizon requiring immediate consideration by governments; or, within this same framework.
2. It is an imminent shortage of economically exploitable world energy reserves.
3. It is a physical shortage of world crude oil reserves within a time horizon requiring immediate consideration by governments; or, within this same framework.
4. It is an imminent shortage of economically exploitable world crude oil reserves.
5. It is an insufficient level of proven world crude oil reserves.
6. It is a worldwide problem, the focus of which is the environmental contamination associated with the heavy reliance on crude oil and coal in the satisfaction of energy requirements.
7. It is an economic problem, the focus of which is the price and security of internationally traded crude oil.

/Essentially these

Essentially these seven conceptions of the world energy crisis collapse into three topical areas: first, the adequacy of the world energy reserves, defined variously with respect to fuel content and economic dimension (Concept 1-5); second, environmental pollution (Concept 6); and, third, the price and security of internationally traded crude oil (Concept 7).

Additionally, the first five concepts collapse into three classes;

- One taking a strictly physical approach to an energy reserve and applying it to the world's stock of total energy reserves (Concept 1), on the one hand, and to the world's stock of oil, on the other (Concept 3).
- Another, taking an economic approach to an energy reserve and applying it to total energy reserves (Concept 2), on the one hand, and to world oil reserves (Concept 4), on the other; and
- One focusing strictly on the sufficiency of the world's proven reserves of crude oil (Concept 5).

Each of these seven conceptions of the world energy crisis will now be subjected to evaluation. In examining the first five concepts, assumptions will be made that bias the case heavily in their favour in each instance. These assumptions will be noted in the text.

(a) The energy crisis as a physical scarcity of total energy reserves - (Concept 1)

In 1969, Averitt estimated that the world's original physical stock of coal was $15{,}240 \times 10^9$ metric tons.1/ After deducting from this total a maximum estimate of the volume of coal consumed through 1973,2/ the

1/ As cited in Models of Doom, H.S.D. Cole, et alia, (eds.), (Universe Books: New York, 1973), p. 100. This estimate excludes deposits of coal located at more than 4,000 ft below the surface as well as beds of less than 12 inches in thickness. Also, the estimate does not include deposits of peat.

2/ The rate of world coal consumption in 1960 (i.e., 2,214 million metric tons) was applied over the period 1950-1966, yielding a volume of coal consumption during this 216 year period of 478×10^9 metric tons. This constitutes a strong upward bias in cumulative coal consumption during this period and, therefore, a strong downward bias in the estimated current stock of world coal reserves. World consumption of coal during 1967-1973, 17×10^9 metric tons, was taken from table 2.

/stock of

stock of oil remaining at the end of 1973 was approximately $14,745 \times 10^9$ metric tons of coal, or the equivalent of roughly $10,322 \times 10^9$ tons of oil. Thus, after satisfying the cumulative requirement for total energy during 1974-2000 (i.e., $418,562 \times 10^6$ oil equivalent metric tons) (table 1) 3/ from coal alone, the remaining physical stock of coal in 2000 (i.e., $9,903 \times 10^9$ oil equivalent tons) would represent 283 years of total world energy consumption at the level of total energy consumption expected in the year 2000 (i.e., 35×10^9 oil equivalent tons, table 1). This is surely not a prospect for alarm today. The concept of the energy crisis as a physical shortage of energy reserves (Concept 1) must be rejected.

(b) The energy crisis as an economic scarcity of total energy reserves - (Concept 2)

In January 1967, the world's stock of measured coal reserves was about $8,817 \times 10^9$ metric tons, or $7,135 \times 10^9$ tons of hard coal equivalent. 4/ After adjusting for the reduction in that stock during 1968-1973, it was the equivalent of, roughly, $4,984 \times 10^9$ tons of oil at the end of 1973. Applying a recovery factor of only 50 per cent to this volume would yield a level of economically exploitable coal reserves of about $2,492 \times 10^9$ tons of oil equivalent. Thus, after satisfying the world's total energy requirements during 1974-2000 from coal alone, the remaining stock of economically exploitable coal would be sufficient to meet the world's total energy requirements for an additional 59 years at the rate of total energy consumption expected in the year 2000. This does not pose a problem which should worry policy-makers today, and, so, this concept of the energy crisis must be rejected.

3/ As noted in the footnote to table 1, the projected levels of total energy consumption being used here contain a strong upward bias, working, in the present context, in favour of those advocating the position of an imminent shortage of world energy resources.

4/ As cited in Models of Doom, H.S.D. Cole, et alia, (eds.), (Universe Books: New York, 1973), p. 99. The figure refers to "measured reserves" of hard and soft coal (i.e., $6,714 \times 10^9$ and $2,104 \times 10^9$ metric tons of coal, respectively, in 1968). The estimate was made under the auspices of the World Power Conference in 1968. On a calorific basis, one metric ton of soft coal equals about, 0.20 metric tons of hard coal. Two boundary conditions used in this estimate are: a maximum overburden of 1,200 metres and a minimum seam thickness of 30 cms. Not all of these reserves are economically recoverable.

/Table 1

Table 1

WORLD COMMERCIAL ENERGY CONSUMPTION, 1960-2000, SELECTED YEARS AND INTERVALS

(10^6 metric tons of oil equivalent)

Year	Coal	Oil	Natural gas	Hydro and nuclear	Total
1960	1 550	1 015	417	76	3 058
1961	1 431	1 066	445	81	3 023
1962	1 459	1 156	488	84	3 187
1963	1 525	1 242	529	87	3 383
1964	1 562	1 341	577	96	3 576
1965	1 584	1 459	619	106	3 768
1966	1 610	1 574	677	114	3 975
1967	1 630	1 686	726	116	4 158
1968	1 604	1 837	793	124	4 358
1969	1 660	1 998	852	129	4 639
1970	1 698	2 160	923	135	4 916
1971	1 739	2 300	981	156	5 176
1972	1 780	2 450	1 043	181	5 454
1973	1 823	2 609	1 109	210	5 751
1974	1 867	2 779	1 178	243	6 067
1975	1 912	2 959	1 253	281	6 405
1976	1 958	3 152	1 332	325	6 767
1977	2 005	3 357	1 416	377	7 155
1978	2 053	3 575	1 505	436	7 569
1979	2 102	3 807	1 600	505	8 014
1980	2 146	4 049	1 697	587	8 479
1981	2 197	4 312	1 804	680	8 993
1982	2 250	4 592	1 918	787	9 547
1983	2 304	4 890	2 038	911	10 143
1984	2 360	5 208	2 167	1 055	10 790
1985	2 416	5 547	2 303	1 222	11 488
1986	2 474	5 908	2 448	1 415	12 245
1987	2 533	6 292	2 603	1 639	13 067
1988	2 594	6 701	2 767	1 898	13 960
1989	2 657	7 137	2 941	2 198	14 933
1990	2 720	7 600	3 126	2 545	15 991
1991	2 785	8 094	3 323	2 947	17 149
1992	2 852	8 620	3 532	3 413	18 417
1993	2 920	9 180	3 754	3 952	19 806
1994	2 990	9 777	3 991	4 576	21 334
1995	3 062	10 413	4 243	5 299	23 017
1996	3 136	11 090	4 510	6 137	24 873
1997	3 211	11 811	4 794	7 106	26 922
1998	3 288	12 579	5 096	8 229	29 192
1999	3 367	13 397	5 417	9 529	31 710
2000	3 448	14 267	5 759	11 035	34 509
1974-1980	14 043	23 678	9 981	2 754	50 456
1974-2000	69 607	191 093	78 515	79 327	418 542

Source and Notes: Volumes for 1960-1970 and for 1980 were taken from: Oil, The Present Situation and Future Prospects, (OECD, Paris, 1973), pp. 41-48. Volumes for intervening and subsequent years are extrapolations made by CEPAL for each fuel separately and, by addition, for total commercial energy consumption. Volumes for each fuel during 1981-2000 were derived by applying the individual compound rate of growth in the consumption of each fuel during 1970-1980 to the intervals up to 2000 and, then, summing for total energy consumption in each year. This method builds in an upward bias in individual component and total energy consumption which, in the present context, favours the case of those arguing for a prospective shortage of world energy resources (i.e., total energy consumption accelerates from 4.8% p.a. during 1960-1970 to 5.6% during 1970-1980 and to 6.6% and 8.0% during 1980-1990 and 1990-2000, respectively).

Additionally, the OECD's projections of world energy consumption through 1980 were made in 1972, at a time when world oil (and energy) prices were substantially lower than those currently expected over the forecast period. Downward revisions in the forecast of component and total energy consumption presented here are therefore in order, and in fact the OECD has done just this in a revised forecast of energy consumption. By not scaling-down these forecast volumes in sympathy with higher expected energy prices, the argument in biased even further in favour of those arguing the case for a prospective world energy shortage.

/Table 2

Table 2

WORLD COMMERCIAL ENERGY CONSUMPTION, 1960-2000, SELECTED YEARS AND INTERVALS, IN NATURAL UNITS

(Units as indicated)

Year	Coal	Oil	Natural gas	Hydro and nuclear
	(10^6 metric tons)		(10^9 m^3)	(10^9 kWh)
1960	2 214	1 015	463	884
1961	2 044	1 066	494	942
1962	2 084	1 156	542	977
1963	2 179	1 242	588	1 012
1964	2 231	1 341	641	1 116
1965	2 263	1 459	688	1 233
1966	2 300	1 574	752	1 326
1967	2 329	1 686	807	1 349
1968	2 291	1 837	881	1 442
1969	2 371	1 998	947	1 500
1970	2 426	2 160	1 025	1 570
1971	2 484	2 300	1 090	1 814
1972	2 543	2 450	1 159	2 105
1973	2 606	2 609	1 232	2 442
1974	2 667	2 779	1 309	2 826
1975	2 731	2 959	1 392	3 267
1976	2 797	3 152	1 480	3 779
1977	2 864	3 357	1 573	4 384
1978	2 933	3 575	1 672	5 070
1979	3 033	3 807	1 778	5 872
1980	3 066	4 049	1 885	6 825
1981	3 139	4 312	2 004	7 907
1982	3 214	4 592	2 131	9 151
1983	3 291	4 890	2 264	10 593
1984	3 371	5 208	2 408	12 267
1985	3 451	5 547	2 559	14 209
1986	3 534	5 908	2 720	16 453
1987	3 619	6 292	2 892	19 058
1988	3 706	6 701	3 074	22 070
1989	3 796	7 137	3 268	25 558
1990	3 886	7 600	3 473	29 593
1991	3 978	8 094	3 692	34 273
1992	4 074	8 620	3 924	39 686
1993	4 171	9 180	4 171	45 953
1994	4 273	9 777	4 434	53 209
1995	4 374	10 413	4 714	61 616
1996	4 480	11 090	5 011	71 360
1997	4 587	11 811	5 327	82 628
1998	4 697	12 579	5 662	95 686
1999	4 810	13 397	6 019	110 802
2000	4 926	14 267	6 399	128 314
1974-1980	20 061	23 678	11 089	32 023
1974-2000	99 438	191 093	87 235	922 409

Source and Notes: The source of these data and the interpolation and projection (1981-2000) methods used in constructing this table (and the inherent biases as well) are the same as indicated in Table 1 (see Sources and Notes).

Conversion factors used are: 1 oil equivalent metric ton x 1.0 = 1 metric ton of oil (i.e., the base unit of measurement); 1 oil equivalent metric ton x 0.7 = 1 metric ton of coal; 1 oil equivalent metric ton x 0.0009=1cubic meter of natural gas; and 1 oil equivalent metric ton x 0.086 = 1 000 kWh of electricity.

/(c) The

(c) The energy crisis as a physical or as an economic scarcity of world oil reserves - (Concepts 3 and 4)

An estimate of the world's physical stock of oil was not available, and, so, an indirect approach had to be taken in evaluating Concept 3.

In 1965, the US Geological Survey (USGS) estimated that, under very relaxed economic assumptions, the world's ultimately recoverable stock of crude oil from conventional sources was 838×10^9 metric tons.5/ This is many times a multiple of a number of other estimates, which are cited below, of these reserves that were made by other under more stringent economic assumptions.

The USGS's estimate will be taken as a minimum estimate of the world's physically available crude oil reserves. It is important to note that this estimate excludes the volume of crude oil extractable from oil shales and oil contained in bituminous rock. Subtracting cumulative oil consumption during 1965-1973 (i.e., 18×10^9 tons of oil), the USGS estimate suggests a minimum physical stock of world oil at the end of 1973 of about 820×10^9 tons. This volume of oil would satisfy world oil requirements during 1974-2000 (i.e., 191×10^9 metric tons of oil: table 2), with 45 years left over at the rate of world oil consumption in the year 2000 (i.e., 14×10^9 metric tons of oil). In this context, and noting the strong downward bias in the stock estimate employed, the concept of the world energy crisis as an imminent physical shortage of oil reserves must be rejected.

5/ As cited in Energy in the World Economy, J. Darmstadter et alia, (Johns Hopkins Press: Baltimore, Md., 1971), p. 50. These reserves are labelled worldwide "possible ultimate recoveries".

/Estimates of

Estimates of the stock of economically exploitable crude oil reserves (the focus of Concept 4) vary widely. In 1950, Pratt's estimate was 82×10^9 tons of crude oil, and the most recent estimate, made by Warman in 1971, presents a range of $164\text{-}274 \times 10^9$ tons. Pratt's figure and lower limit of Warman's would not support world oil requirements through the year 2000; and, while Warman's upper limit would, there would remain only 6 years of economically exploitable world crude oil reserves beyond the year 2000 at the rate of oil consumption anticipated in that year. The remaining estimates of the world reserves of economically exploitable crude oil have implications for world crude oil sufficiency falling within those of Pratt's and Warman's.6/

None of the above estimates of economically exploitable crude oil reserves includes the volume of "known recoverable reserves" of crude oil extractable from "undiscovered and/or marginal and submarginal resources", that is, from shale oil and oil contained in bituminous rock: about 15 trillion barrels, or roughly 2.1×10^{12} tons of crude oil.7/ This volume of oil alone would satisfy world crude oil requirements to the year 2000 with the equivalent of 134 years left over at the rate of world oil consumption anticipated in the year 2000. When added to the lowest estimate of the stock of economically exploitable conventional crude oil (Pratt's in 1950: 82×10^9 tons) the resulting aggregate would satisfy world crude oil requirements through the year 2000 with 140 years left over at the rate of world oil consumption projected for that year.

6/ These estimates are presented in the following source: Models of Doom, H.S.D. Cole et alia, (eds.), (Universe Books: New York, 1973), p. 95. The estimates (in barrels of crude oil) are the following (date of estimate in parenthesis): Pratt, 600 x 10 (1950); Levorsen, $1{,}500 \times 10^9$ (1950); Shell, $1{,}800 \times 10^9$ (1968); Moody, $1{,}800 \times 10^9$ (1970); Weeks, $2{,}200 \times 10^9$ (1960); Hendricks, $2{,}480 \times 10^9$ (1968); King Hubbard, $1{,}350\text{-}2{,}100 \times 10^9$ (1969); Warman, $1{,}200\text{-}2{,}000 \times 10^9$ (1971). One metric ton of oil is taken to equal 7.3 barrels of oil.

7/ As cited in Energy in the World Economy, J. Darmstadter et alia, (Johns Hopkins Press: Baltimore, Md.), p. 50.

/These calculations

These calculations prompt two general conclusions. If the concept of the energy crisis is stated in terms of an imminent shortage of economically exploitable reserves of world crude oil, including deposits in oil shales and bituminous rock, the position is outlandish in terms of a policy focus today. But, if that conception of reserve adequacy is drawn only with respect to conventional sources of crude oil (i.e., excluding oil shales and oil deposits in bituminous rock), there appears to be a strong case for anticipating a shortage in these reserves toward the end of the century, or shortly thereafter. The reserve estimates on which this conclusion is based may be hopelessly in error: no one really knows. But, even though the empirical case for the assertion of this situation by the turn of the century is weak, it must be taken seriously.

Still, even if this were the case, a doomsday attitude would be misguided.8/ Long before the world's reserves of economically exploitable oil from convention crude oil sources are exhausted, new technologies will be available that will ease the pressure on these reserves. This statement should not be construed as any easy dismissal of the problem: these technologies are already identified and in various stages of technical development. The liquification of coal alone, a technology that is probably viable economically today at many sites, could remove the exhaustion of oil supplies so far into the future as to eliminate it as a serious threat.9/ Additionally, electricity supplied from breeder reactors and other improved generating technologies together with price-induced deceleration in oil demand stemming from efficiencies in its use in household, transport, and industrial application as well as shifts out of oil to other fuel in

8/ This topic is discussed in two other Symposium papers which focus on the long-run prospects for world energy supply.

9/ One technology, now in the pilot plant phase in the US., consists in effect, of spiking coal with hydrogen (and, in the process, reducing the sulphur content of the coal per unit of weight). A coal is then produced with a higher btu content per unit of weight. This technology is of particular relevance to Latin America, given the region's relatively large reserves of coal, typically of low calorific value. For an extended discussion of this technology, refer to the Symposium paper by R. Suárez: El carbón latinoamericano y sus perspectivas.

/many energy

many energy markets could stave off depletion in conventional sources of world oil to a point in time long after virtually unlimited energy supplies could be secured from such sources as nuclear fusion, hydrogen, or solar energy.

(d) The energy crisis as a shortage of world proven reserves of crude oil - (Concept 5)

At the end of 1971, the world's proven reserves of crude oil were estimated at 584 billion barrels, or about 80 billion tons of crude oil, or 33 times the level of oil consumption in that year (table 3).10/ At projected levels of crude oil consumption, and with no addition to these reserves, they would be exhausted in 1989. This spectre, and the imminence of its timing, constitute the heart of the argument that the world energy crisis should be viewed as an inadequate level of the world's proven reserves of crude oil.

The argument is falacious, despite the widespread respect accorded it. It reflects an erroneous approach to the economic dimension of a resource. Moreover, it is based on a naïve conception of investment in oil inventories. Finally, it fails to put the 1971 ratio into historical perspective.

A proven reserve of crude oil is a rough, and conservatively biased, estimate of the volume of crude oil that could be produced from known fields under the economic conditions existing at the time it is made. Estimates of proven oil reserves exclude that volume of crude oil which is known to exist, but would not be lifted under existing economic conditions.

10/ As cited in Oil, The Present Situation and Future Prospects, OECD, Paris, 1973, p. 55. The Oil and Gas Journal cites an end-1971 world proven crude oil reserve figure of 631.9 billion barrels, and, implicitly, a reserve production figure in that year of 36.1 years. About 63 per cent of these reserves were located in the Middle East.

/Table 3

Table 3

WORLD CRUDE OIL PRODUCTION AND WORLD PROVEN CRUDE OIL RESERVES, 1944-1973, SELECTED YEARS

Year	End-of-Year Reserves	Production	Ration of Reserves to Production
	(millions of barrels)		years
1944	50.684	2.593	19.5
1963	309.633	9.498	32.6
1971	631.856 (583.500)	17.479	36.1 (33.4)
1972	666.883	18.140	36.8
1973	627.856	20.153	31.2

Source: Data for 1944 and 1963 were taken from American Petroleum Institute, Facts and Figures (various editions) as cited in J. Mullen, Energy in the Japanese Economy, (1868-1964), (Unpublished Doctoral Dissertation, New York University, 1972), p. 181; and, the data for the remaining years were taken from Oil and Gas Journal (December 1971 and 1972 editions). The end-1971 figure for proven world oil reserves (in parenthesis) is that cited in the O.E.C.D. source, Oil. The Present Situation and Future Prospects, O.E.C.D., Paris, 1973, p. 55.

Since the end of 1971, the world's crude oil price structure has increased sharply. For example, the average market price (FOB, Persian Gulf) of Saudi Arabian light crude oil in 1971 was about US$ 1.33 per barrel while, in January, 1974 that price was about US$ 7.65 per barrel. In short, throughout the world, the volume of economically extractable crude oil known to exist in specific fields has jumped sharply in response to the increase in crude oil prices, and this constitutes an automatic increase in the world's proven reserves of crude oil. No one knows the volume of the world's proven oil reserves under economic conditions existing now, as opposed to 1971. One thing is certain, however: reference to the exhaustion of these reserves by 1990 is, clearly, not a defensible position to take today.

/Another important

Another important aspect of this conception of the energy crisis lies in the inadequacy of the underlying idea of how decisions are made to invest, or not to invest, in proving a reserve, and, hence, in the lack of appreciation of what a proven reserve really is, economically.

A crude oil producing company needs an in-ground inventory of oil for normal business reasons. That oil may be in one of two physical forms. First: in a known field containing: (a) a more or less known volume of crude oil recoverable at given prices and costs (i.e., proven reserves); or (b) in the form of an imperfectly known quantity of oil which, with increasing development expenditures, can be defined with increasing accuracy (i.e., the conversion of a probable crude oil reserve into a proven crude oil reserve). The second form in which oil inventories may be held, (at least, conceptually in a probabilistic sense) is in unknown fields open, either now or in the future, through negotiation with its owners, to exploration and possible exploitation by the oil company.

In this context, the crude oil producing company has a choice, then, of holding in-ground crude oil in one or more of several forms:

(a) In the form of a proven reserve, the supply of which will require immediate incremental production costs varying with the volume of oil produced, but not incremental development or incremental exploration costs.

(b) In the form of a probable reserve in a known, but imperfectly defined, field, the incremental supply from which will require both incremental development and incremental production expenditures.

(c) In a known field containing an unknown volume of oil, the incremental supply from which will require incremental exploration, development, and production expenditures.

As an economic maximizer, the crude oil producing company will choose the least-cost of these three routes for satisfying its crude oil inventory requirement. It makes no sense for it to spend money now to convert probable to proven crude oil reserves for subsequent production from them unless this route is expected to be cheaper, at the margin, than to produce directly from proven reserves. Likewise,

/it makes

it makes no sense for a crude oil supplying company to invest in finding and proving reserves in fields now unknown if the expected costs of so doing are higher than the cost of converting probable reserves in known fields to proven reserves for future production or of producing directly from proven reserves in the future.

Viewed in this context, it is absurd to look at the level of proven oil reserves either as: (1) the only form in which an oil company can hold an inventory of oil; or (2) the necessarily desirable form in which an oil company should hold that inventory.

But, even putting aside the falacious interpretation of published estimates of world crude oil reserves, the concept of the energy crisis as an inadequate level of these reserves, doesn't square with the historical record of oil inventories held in this form. The data below show that the OECD-based ratio of 33:1 in 1971 is, in fact, consistent with recent historical levels of this ratio. Moreover, in 1944, that ration was only 20:1, and the world avoided catastrophy.

The conception of the world energy crisis as an insufficient level of proven world reserves of crude oil (Concept 5) is not at all convincing, and it is rejected.

(e) Five scarcity interpretations of the energy crisis: Summary

Five conceptions of the energy crisis have been examined which interpreted that crisis in terms of a scarcity in energy reserves, variously defined.

A scarcity in total energy reserves, in either a physical or an economic context, was found to be clearly indefensible.

Two concepts of a scarcity in world oil reserves were also examined. The first was stated in physical terms. It was tested using a grossly underestimated stock of world oil reserves. Even so, the concept of a physical scarcity in world oil reserves was found to be an inadmissible subject for alarm today.

The concept of the energy crisis as a shortage of economically exploitable reserves of crude oil was found to be unacceptable if those reserves are defined to include the economically exploitable oil

/contained in

contained in shale and bituminous rock. If, on the other hand, these two unconventional sources of world oil supplies are excluded, a scarcity in the volume of economically exploitable reserves of world crude oil is a possibility by the turn of the century, or shortly after. But, apart from the indefensibility of excluding this component of world oil reserves, the estimates on which this expectation is based leave much room for doubt. Even in this case, however, new technologies of energy supply, such as coal liquification and breeder reactors, for example, suggest good grounds for anticipation relief from the spectre of inadequate reserves of conventionally defined sources of economically exploitable oil long before the threat becomes a reality.

The assertion of an inadequate level of the world's proven oil reserves was evaluated and found indefensible. Current levels of the reserve: production ratio are comparable with levels recorded in the post-war period. Additionally, the widespread misunderstanding of the significance of proven oil reserves has supported indefensible interpretations of the published figure of the world's proven reserves of crude oil.

In evaluating each of the first five concepts of the energy crisis, assumptions were made that biased the case in their favour at every step. No account was taken of the additions to energy reserves triggered, in an economic sense, from the increased price of oil since the reserve estimates used in this paper were made. The projection of world energy and oil consumption was based on oil prices existing several years ago. Current oil prices call for a downward revision of those projected levels of consumption. But, even in their best form, none of these five concepts of the energy crisis should excite policy-makers today to alarm.

Finally, none of these five concepts of the world energy crisis penetrates very deeply in an analytic sense. None focuses, for example, on the location of an energy reserve, either in a physical, political, or economic sense. The two conceptions of the energy crisis that were stated in strictly physical terms treat as quantitatively identical an energy, or oil reserve 2,000 metres below the south pole and a

/similar reserve

similar reserve 500 metres below the surface in Saudi Arabia: this is clearly absurd from an economic and political point of view. Likewise, the conceptions of the energy crisis that were stated in terms of an imminent economic scarcity in total energy and in crude oil reserves also ignored the geographic location and political dimension of an energy reserve and, so, they must also be viewed as analytically naïve in their formulation.

(f) Environmental deterioration and the energy crisis

The destructive impact on the environment associated with the satisfaction of world energy requirements is a topic of strong and valid concern in many countries. A good deal of this concern has focused on the deletarious consequences on the environment of the world's continuing heavy reliance on coal and crude oil for satisfying its commercial energy requirements.

There is a wide variety of environmentalist positions. But, in the present context, two basic ones can be indentified: one which places emphasis on the scarcity of total or component energy reserves; and, a second, and not mutually exclusive one which views the problem of environmental quality in a much broader perspective, an important component of which is the polluting aspects of the world's energy use pattern.

With respect to the first position, the empirical basis for arguing in favour of an imminent world crisis in energy reserves takes several forms. But, the major ones have been covered in the previous evaluation of five concepts of reserve inadequacy. They were rejected on the basis that none of them constitutes a convincing case for identifying a crisis situation today.

With reference to the second position, it would be erroneous to equate the broadly oriented environmentalist position with a narrow focus on the polluting impact of the world's energy consumption pattern. In fact, the environmentalist is focusing on a problem which, while encompassing this latter relationship, is much broader: the negative

/environmental effects

environmental effects of economic growth, not only in the form of chemical pollution, but also in terms of resource deterioration, biologic pollution, physical and social disruption as well.

It is obvious that the environmental impact of actions triggered by the world energy crisis (however defined) will be of the utmost importance to environmentalists along a broad front. If the problem is defined, for example, as the current price of internationally traded crude oil (relative to past prices and/or its long-run supply costs), some environmentalists will view positively the resulting substitution out of crude oil, say, to hydropower in the world electric power industry. Others, anticipating a substitution of higher sulphur crude oil and coal for lower-sulphur, but higher-priced crude oil may be dismayed on purely physical grounds, but understand and, in some cases, perhaps, grudgingly accept the immediate economic case for the shift. But, the basic point should not be overlooked: whatever actions are taken to confront the world energy crisis, they will surely have their consequences for environmental deterioration. However, this, in and of itself, is not sufficient to equate that crisis with the more broadly oriented problem of economic growth and environment on which many environmentalists are focusing.

(g) The world energy crisis: The price and security of internationally traded crude oil

Table 4 presents data on the current price and long-run supply cost (constant 1968 prices) of crude oil produced in the major export centres of the world crude oil industry. This comparison shows that the price of crude oil exported from these countries is many times a multiple of long-run supply cost. The comparison in the case of Saudi Arabian crude oil reflects the general pattern: estimated per barrel market price (January, 1974) US$ 7.65, vis-à-vis its long-run supply cost (in 1968 prices): US$ 0.20.

/Table 4

Table 4

SELECTED PRICE OF COST DATA FOR VARIOUS CRUDE OILS

(In units as indicated)

Area and years	Development investment per daily barrel	Cost per barrel (1968 prices)						Memo:	
		Development	Operating (including pipelines)	Total	Operating plus development (mid-1980s)	Freight advantage over Persian Gulf (1980)	Long-run supply price (1970-1985)	Estimated market price, 1968: $/bbl.	Estimated market price, 1974(Jan.) $/bbl.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
United States, 1960-1963	2 280	1.048	0.168a/	1.22	...	...	...	...	
Venezuela, 1966-1968	417	0.351	0.101	0.462	...	0.42	0.64	1.83	
Africa,									
Libya, 1966-1968	129	0.074	0.085	0.159	...	0.34	0.54	...	
Algeria, 1966-1968	293	0.180	0.100	0.280	...	0.37	0.57	...	
Nigeria, 1965-1966	165	0.094	0.070	0.164	...	0.26	0.46	...	
Persian Gulf									
Iran Consortium, 1963-1969	90	0.047	0.050	0.097	0.14	...	0.20	...	
Iraq, 1966-1968	47	0.025	0.045	0.070	0.12	...	0.20	1.22	
Kuwait, 1966-1968	114	0.060	0.045	0.105	0.20	...	0.20	1.09	
Saudi Arabia, 1966-1968	78	0.041	0.045	0.086	0.18	...	0.20	1.30	7.65

Source and Notes: The figures in columns (8) and (9) were taken from Table 5. The rest of the entries in the table are reproduced in their entirety from: M.A. Adelman, The World Petroleum Market (Johns Hopkins Press: Baltimore, 1972), p. 76. Long-run supply price refers to incremental operating-development costs under the condition of increasing output. The calculations include consideration of the physical decline date of reservoirs, the cost of capital and risk, and the conventional economic costs for crude oil development and operation, which do not include taxes, royalties and similar financial, but not economic, charges to cost. For a more detailed explanation of the methodology underlying the derivation of the figures in columns (1) - (7), the reader is referred to Chapter II of the book cited above.

/Table 5

Table 5 presents price data since 1958 for some of the major crude oils imported into Latin America's oil-deficit countries. Taken in conjunction with the data in table 4, these figures support the conclusion that, for many years, the oil-importing countries - both developed and developing - have been paying a unit price for their imported crude oil many times a multiple of its long-run economic costs of supply. During 1958-1969, this price/cost gap declined consistently, but, since then, it has been rising, and, in 1974, it has reached unprecedented proportions.

The previous comparison between the market price of internationally traded crude oil and its long-run supply cost reveals the extent of the economic rent involved in the crude oil supplying business. Increasingly, a larger fraction of this economic rent has been accruing to the host oil countries relative to the international oil companies (table 6).

But, this is only one component of the economic rent generated in the oil business, from the production of oil to its sale in the form of refined oil products in final markets. The other major component of this economic rent is taken by the governments of the oil-importing countries in the form of revenues derived from their taxation of crude oil and refined oil products. As estimated later, and shown in table 7, in Latin America's oil-deficit countries, average tax revenues per barrel of refined oil products sold in 1973 in the domestic market probably fell within a range of US$ 0.84-US$ 2.44/barrel, in comparison with the difference between market price and the cost of supplying, for example, Saudi Arabian crude oil in 1973: US$ 2.20-US$ 0.15=US$ 2.05 per barrel.

/Table 5

Table 5

ESTIMATES OF MARKET PRICE OF THE MAJOR CRUDE OILS IMPORTED BY LATIN AMERICA'S OIL-DEFICIT COUNTRIES, 1958-1972

($/bbl., FOB)

Year	Venezuela (avg)	Saudi Arabia (34° API)	Iraq (36° API)	Kuwait (31° API)	Estimated discount off posted price: Saudi Arabian crude: 340 API
1958	2.48	1.83	1.73	1.60	0.25
1959	2.19	1.70	1.44	1.31	0.38
1960	2.08	1.53	1.41	1.27	0.37
1961	2.10	1.45	1.37	1.24	0.35
1962	2.06	1.42	1.34	1.21	0.38
1963	2.02	1.40	1.32	1.19	0.40
1964	1.95	1.33	1.25	1.12	0.47
1965	1.89	1.33	1.25	1.12	0.47
1966	1.86	1.33	1.25	1.12	0.47
1967	1.84	1.33	1.25	1.12	0.47
1968	1.83	1.30	1.22	1.09	0.50
1969	1.79	1.28	1.20	1.07	0.52
1970	1.78	1.26	1.18	1.14	0.54
1971	2.25	1.33	1.25	1.62	0.47
1972	2.43	1.75	1.90	1.83	0.54
1973	...	2.30(April)	3.27(April)	2.29(April)	0.44
1974	...	7.65(Jan.)	...	7.55(Jan.)	4.00

Source and Notes: Venezuela (average realized selling price of a variety of crude oils, FOB) Ministerio de Minas e Hidrocarburos, Oficina de Economía Petrolera, Petróleo y Otros Datos Estadísticos, (Caracas, 1973), p. 169. Saudi Arabia: IBRD, Public Utilities, The Changing Energy Scene, P.U. Note N° 7, draft dated December 19, 1973, Table 1, (page not numbered) and reproduced in this text as Table 12. Iraq and Iran: The annual average discounts off the posted price of Saudi Arabian light crude oil given in the above IBRD study (shown above in last column) were subtracted from the annual average posted prices of these two crude oils as shown in Ministerio de Minas e Hidrocarburos op.cit, p. 205. The resulting figures for average annual market prices for these two crude oils are therefore only approximations.

The January 1974 figure for Kuwait (34° API) was taken from Petroleum Economist, May, 1974, p. 198, and the April, 1973 figure was taken from Petroleum Press Service, June, 1973, p. 238.

/Table 6

Table 6

ESTIMATED LEVELS OF POSTED PRICE, MARKET PRICE, COST, GOVERNMENT REVENUE AND COMPANY MARGIN FOR SAUDI ARABIAN LIGHT CRUDE OIL: 1958 - JANUARY 1974

($ per barrel)

Date	Posted price	Market price	Production cost	Government revenue: (a)	Company margin: (b)	a / (a + b)
Average, 1958	2.08	1.83	0.15	1.00	0.68	0.60
Average 1968	1.80	1.30	0.15	0.86	0.29	0.75
April 1, 1973	2.74	2.30	0.15	1.57	0.58	0.73
January 1, 1974	11.65	7.65	0.15	7.00	0.50	0.93

Source and Notes: See Table 13 for source. Company margin equals market price less government revenues (i.e., taxes and royalties) and production costs: $0.15/barrel, the meaning of which is not defined in the source document. In 1968, this figures is roughly comparable with Adelman's estimate of development and operating costs of $0.18 per barrel (in 1968 prices) for Saudi Arabian crude oil (see table 4). Adelman's Saudi Arabian estimate is based on 1966-1968 data, and it is stated in 1968 prices. It refers to supply flows in the mid-eighties. See: M.A. Adelman, The World Petroleum Market, (Johns Hopkins Press: Baltimore, 1972), p. 76.

Table 7

ESTIMATED CHANGES IN THE AVERAGE FINAL MARKET VALUE OF ONE BARREL OF CRUDE OIL SOLD ON THE DOMESTIC MARKET: MINIMUM AND MAXIMUM LEVELS, 1973-1974

(US$/bbl)

	1973 : Range		1974 : Range (with changes in margin)			
	Minimum (A)	Maximum (B)	Minimum (C)	Maximum (D)	Minimum (E)	Maximum ( )
1) Import, FOB	2.20	2.20	7.00	7.00	10.00	10.00
2) Freight, insurance, etc.	1.30	1.56	1.30	1.56	1.30	1.56
3) Refining	0.50	0.50	0.50	0.50	0.50	0.50
4) Marketing	0.85	1.05	0.85	1.05	0.85	1.05
5) Margin	0.73	0.80	1.45	1.52	1.90	1.97
6) Taxes	0.84	2.44	1.66	4.65	2.18	6.03
Total	6.42	8.55	12.76	16.28	16.73	21.11

Notes: Line 1: For Saudi Arabian light, FOB, Persian Gulf. Data for 1973 taken from Table 12.

Line 2-4: ECLA estimates.

Line 5: Estimated at 15% of the sum of lines 1, 2, 3 and 4, for both the minimum and maximum cases.

Line 6: In the minimum case, a tax rate of 15% on the sum of lines 1 - 4 was assumed; in the maximum case a 40% tax rate was applied to the same base.

/By way

By way of comparison, in many European countries the average tax revenue per barrel of refined products sold in final markets is higher than in many of Latin America's oil-deficit countries. This is due largely to the relatively higher tax rates applied on motor gasoline in the former group of countries than in the latter.11/

When the price of a commodity of such pervasive importance as crude oil quadruples over a two-year period, it is a subject for immediate discussion by top policy makers, individually and severally on a world-wide scale. The ramifications of this price change extend to every country in the world in terms of its impact on prices, production, employment, investment, consumption, and the balance of payments. Collectively, it presents a massive shift in the distribution of world income and intensifies the previously existing and grave problem of international liquidity, which also impacts each nation in the world, although unequally in terms of the severity involved. Even on the slightest reflection, one conclusion is unshakeable: in terms of problem immediacy and the potential negative economic and financial ramifications of its continuance, the problem raised by the sharp increases recently recorded in the price of internationally traded crude oil is now among the most pressing in the world economic arena.

To what extent is the security of world oil supplies a valid subject for discussion in the present context? In approaching this question, it is best to ask a prior one: what is meant by the security of internationally traded crude oil supplies?

11/ In 1969, for example, the average revenue accruing to West European governments from oil taxes was US$ 5.10/barrel, or about 47 per cent of the average final market value per barrel of oil products sold. The comparable ratio for Latin America's oil-deficit countries in 1973 was between 13 per cent-29 per cent (table 7). The 47 per cent figure was taken from: La Industria del Petróleo en América Latina: Notas sobre su Evolución Reciente y Perspectivas, Economic Commission for Latin America, United Nations, New York, 1973 (E/CN.12/940), p. 54. Data for 1972, prepared by Shell, covering West European countries and the U.K. indicate that the weighted average take of consumer governments was 54 per cent of the average price of a barrel of refined products sold in final markets. See: Petroleum Intelligence Weekly, April 29, 1974, p. 6.

The concept, security of imported crude oil supplies, is rarely clarified by its users. It is generally employed in reference to the widespread desire by governments for continuously assured access to requisite volumes of imported oil, implicitly, under any and all circumstances. Such a desire is as widespread as it is chimerical.

The simplest reflection will suggest that oil-importing countries can never achieve security in this absolute sense. If they have crude oil-producing ventures abroad, one conventional approach to the security problem, difficulties with host producer countries can endanger them: the post-war history of the international oil industry offers many examples. Long-term crude oil contracts may be ruptured for various reasons. In such a situation, international buyers, in general, face the prospect of sharp increases in oil prices, such as occurred in late 1973.

Domestic stockpiles of crude oil do provide real physical security in the above sense, but only for relatively short periods, which may, of course, be their objective. But, even in this potentially viable solution to the security problem in the immediate future, its economic evaluation requires an explicit assumption on expected crude oil prices (and on capital and other costs). To the extent that a policy of domestic stockpiling of imported oil is pursued on a broad international front, it constitutes an immediate upward pressure on the price of internationally traded crude oil. Hopefully, this effect would be offset in the future by a downward pressure on crude oil prices in periods of disrupted world oil markets. Once again, price and security are conceptually close relatives.

If security is approached in terms of the ability to satisfy all future oil consumption from domestic reserves of crude oil, conceived by some as the absolute in security, it is an approach which needs to be defended. Whether or not this approach makes sense economically turns on a comparison of the expected present value of savings over time associated with this strategy, on the one hand, with the costs of its adoption on the other. Fiat adoption of this policy is not its own economic defense: its defensibility rests largely on the expected price of imported crude oil. Here again, one cannot realistically approach the problem of security in crude oil supplies without focusing squarely on expected crude oil prices.

Aside from self-sufficiency, the ultimate in security is the ability to pay for imported crude oil available from international sellers in a strong bargaining position. Viewed in this context, it makes sense to include security of supply as a topic both related and subordinate to the more critical issue: the price of internationally traded crude oil.

B. THE BACKGROUND OF THE PROBLEM

This section places the world problem of the recent jump in world crude oil prices in brief historical perspective. It documents the pattern of change in the world and Latin American energy bases since the mid-fifties, and it indicates the pivotal forces underlying this record. Within this context, it also presents data on the trends in the price of internationally traded crude oil since the late fifties, and it suggests the key factors that have accounted for these trends as well.

In this latter regard, the emphasis of this discussion is not on explaining the level of crude oil prices at any one point-in-time since the late fifties. It is, rather, on explaining the main forces that have conditioned the basic trends in world crude oil prices since that time. To do the former would expand the scope of this paper unnecessarily. To omit the latter would not only obscure the dynamics of the crude oil price problem, but, also, it would leave unclear the strategic basis for Latin American oil-deficit countries for confronting that problem in the future.

/1. The

1. The world shift to oil

The data in table 8 underscore the rapidity of growth in world oil consumption and the increasing global reliance on oil since the fifties. These data also indicate that Latin America's energy base has been dominated by oil longer than any other region in the world.

On the other hand, in absolute terms, the volume of Latin America's oil consumption is minor in world terms. The region accounted for only 6.6 per cent of world oil consumption in 1965 (6.3 per cent in 1971), and for approximately the same share in the increment of world oil consumption during 1950-1965. Latin America's low share in world oil consumption reflects its comparatively small share in total world income, the relatively high proportion of non-industrial activity in the economies of the region, the widespread reliance on comparatively low energy-intensive techniques of production, and the relatively high reliance on vegetable fuels in the region's total energy base (i.e., about 20 per cent in 1972).

The increasing world dependence on oil in the postwar era has been the result of many interacting forces, chief among which have been: the strong declines in its (real) price relative to those of other energy sources: the reductions recorded in the (real) unit cost of its transportation and marketing; the increasing world reliance on transportation media technologically locked to the use of refined oil products such as automobiles, trucks, and airplanes; the broad array of physical efficiencies that oil offers (relative to coal) in its transport, handling, burning, and disposal, for example; and the rapid growth in the petrochemical and artificial fertilizer industries.

/Table 8

Table 8

WORLD ENERGY CONSUMPTION: PERCENTAGE DISTRIBUTION BY SOURCE AND MAJOR REGION, 1925, 1950 AND 1965

Region	Solid fuels			Liquid fuels			Natural gas			Hydroelectricity			Total		
	1925	1950	1965	1925	1950	1965	1925	1950	1965	1925	1950	1965	1925	1950	1965
A. As per cent of each region's total energy consumption															
Latin America	37.6	13.0	6.4	56.6	73.2	70.9	4.2	11.0	19.5	1.6	2.7	3.2	100.0	100.0	100.0
North America	74.5	43.0	23.6	18.9	37.5	43.4	6.0	18.0	31.1	0.6	1.5	1.9	100.0	100.0	100.0
of which:															
United States	74.2	42.3	24.3	19.2	37.7	42.9	6.2	18.9	31.5	0.5	1.1	1.3	100.0	100.0	100.0
Western Europe	96.0	83.8	47.1	3.2	13.5	47.1	-	0.3	2.5	0.7	2.4	3.3	100.0	100.0	100.0
Oceania	92.6	72.0	51.7	6.9	26.1	44.7	-	-	-	0.5	1.9	3.5	100.0	100.0	100.0
Asia	83.1	68.4	37.6	14.4	24.8	54.2	0.8	1.8	5.0	1.7	5.1	3.2	100.0	100.0	100.0
Japan	92.4	83.2	35.5	4.4	6.1	58.4	0.1	0.2	1.4	3.1	10.4	4.7	100.0	100.0	100.0
Other Asia	73.7	57.0	39.6	24.6	39.0	50.2	1.5	3.0	8.4	0.2	0.9	1.8	100.0	100.0	100.0
Africa	91.6	67.7	57.2	8.3	31.9	39.4	-	-	1.6	0.1	0.4	1.8	100.0	100.0	100.0
World	82.9	61.0	41.8	13.3	27.7	39.4	3.2	9.7	16.7	0.7	1.7	2.1	100.0	100.0	100.0
B. As per cent of world consumption of each energy source															
Latin America	0.8	0.5	0.6	7.1	6.7	6.6	2.1	2.9	4.3	4.0	4.1	5.7	1.7	2.5	3.6
North America	45.4	34.4	21.0	71.9	66.3	41.0	93.9	91.3	69.5	45.0	44.1	34.8	50.4	48.9	37.3
of which:															
United States	43.3	31.9	20.0	69.9	62.7	37.3	92.6	90.2	65.0	34.0	29.6	21.9	48.3	46.0	34.4
Western Europe	40.4	30.7	23.0	8.5	10.9	24.4	-	0.7	3.1	39.2	32.0	32.6	34.8	22.4	20.4
Oceania	1.2	1.3	1.4	0.5	1.1	1.3	-	-	-	0.8	1.3	1.9	1.1	1.1	1.1
Asia	4.1	4.5	6.3	4.4	3.6	9.7	1.0	0.8	2.1	10.1	12.3	11.1	4.1	4.1	7.0
Japan	2.3	2.4	2.9	0.7	0.4	5.1	0.1	-	0.3	9.7	11.0	7.8	2.1	1.8	3.4
Other Asia	1.8	2.1	3.4	3.7	3.2	4.6	0.9	0.7	1.8	0.5	1.3	3.2	2.0	2.3	3.6
Africa	1.0	1.3	2.3	0.6	1.9	1.7	-	-	0.2	0.1	0.4	1.5	0.9	1.6	1.7
World	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
World (mill. met. tons coal equiv.)	(1 230.0)	(1 593.2)	(2 290.8)	(196.7)	(722.2)	(2 159.1)	(47.9)	(252.1)	(912.1)	(9.8)	(43.4)	(112.6)	(1 434.5)	(2 610.9)	(5 474.6)

Source: This table is reproduced from: J. Darmstadter et alia, Energy in the World Economy, (Johns Hopkins Press: Baltimore, 1971), p. 86.

/In Latin

In Latin America, these same forces were also operational, and the region's comparatively earlier shift to, and greater reliance on, oil is explained, to a great extent, by three additional factors: the relative scarcity of high grade coal deposits in the region taken in conjunction with relatively high transport cost of coal; the prohibitive effect of the pronounced capital scarcity in the region on the rate of exploitation of its abundant hydropower potential; and the immense reserves of crude oil available in the region at comparatively low transport cost to its leading centres of production and consumption.

The data in table 9 underscore the high reliance of many Latin American economies on imported oil and, as shown in table 10, on oil imports from Middle Eastern sources, in particular.

On the other hand, in strictly volumetric terms, Latin America's oil import requirements are relatively minor when compared to the aggregate volume exported from the world's major oil exporting countries. In 1972, for example, the region's imports of crude oil and refined products constituted only 6.8 per cent and 10.0 per cent, respectively of OPEC-country exports of these products; and its oil imports from Middle Eastern countries accounted for only 4.2 per cent and 2.2 per cent of their exports of crude oil and refined oil products, respectively, in that year.12/

12/ These percentages were calculated on the basis of data presented in the Annual Statistical Bulletin of OPEC, 1972.

/Table 9

Table 9

DEGREE OF EXTERNAL DEPENDENCE ON CRUDE OIL IN SELECTED LATIN AMERICAN COUNTRIES, 1972

(In 10^3 cubic metres and per cent, as indicated)

Country	Production (A)	Imports (B)	Exports (C)	Refinery throughput (D)	External dependence: $100 (1 - \frac{A}{D-C})$ (percent)
Argentina	25 193	1 736	28	26 904	6.3
Bolivia	2 539	-	1 740	827	-
Brazil	9 712	28 453	1 203	38 009	73.6
Colombia	11 395	-	2 373	9 008	-
Costa Rica	-	435	-	435a/	100.0
Cuba	203b/	5 500b/	-	5 700b/	96.4
Chile	1 991	4 256	-	5 996	66.8
Ecuador	4 544	1 356	4 019	1 356	-
El Salvador	-	483	-	483a/	100.0
Guatemala	-	...	-	883	100.0
Guyana	-	...	-	...	...
Haiti	-	-	-	-	c/
Honduras	-	699	-	699a/	100.0
Jamaica	-	1 567	-	1 567a/	100.0
Mexico	29 157	1 835	-	30 524	4.5
Nicaragua	-	552	-	552a/	100.0
Panama	-	4 510	-	4 510	100.0
Paraguay	-	161	-	161a/	100.0
Perú	3 759	1 903	171	5 476	29.1
Dominican Republic	-	-	-	-	c/
Surinam	-	...	-	...	...
Trinidad and Tobago	8 142	16 946	3 426	22 084	-
Uruguay	-	1 794	-	1 899	100.0
Venezuela	187 365	-	124 085	65 475	-
Total	284 000	72 191	137 045	222 540	42.8d/

Source: ECLA, on the basis of official data.

a/ In the absence of data on the volume of crude oil refined, it was assumed that all imported crude oil was refined.

b/ Estimate.

c/ Imported only refined oil products in 1972.

d/ Excluding self-sufficient countries.

/Table 10

Table 10

CRUDE OIL IMPORTS INTO SELECTED LATIN AMERICAN COUNTRIES AND INTO CENTRAL AMERICA, 1970-1972, BY EXPORTING REGION AND COUNTRY

(10^3 cubic metres)

Country		Total crude oil imports	Middle East	Africa	Vene-zuela	Colombia	Ecuador	Peru	Boli-via	All others
Argentina	1970	1 684	628	22	386	-	44	42	530	32
	1971	2 543	1 338	-	282	-	53	27	613	230
	1972	1 736	522	-	346	-	35	5	828	-
Brazil	1970	18 675	11 466	4 519	2 634	-	-	56	-	-
	1971	24 400	15 372	6 271	2 757	-	-	-	-	-
	1972	28 458	21 194	4 632	1 736	-	107	-	267	522
Chile	1970	2 385	971	-	554	854	-	-	6	-
	1971	3 740	2 112	-	779	704	-	-	145	-
	1972	4 256	3 070	-	574	143	235	-	234	-
	1973	3 883	2 411	-	506	38	652		275	
Ecuador	1970	1 132	-	-	1 132	-	-	-	-	-
	1971	1 414	-	-	1 414	-	-	-	-	-
	1972	1 356	-	-	1 356a/	-	-	-	-	-
Mexico	1970	-	-	-	-	-	-	-	-	-
	1971	107	-	-	107	-	-	-	-	-
	1972	1 835	-	-	1 835	-	-	-	-	-
Panama	1970	4 179	-	-	4 179	-	-	-	-	-
	1971	4 459	-	-	4 459	-	-	-	-	-
	1972	4 510	233	-	3 706	-	571	-	-	-
Peru	1970	791	-	-	791	-	-	-	-	-
	1971	1 761	-	-	1 761	-	-	-	-	-
	1972	1 903	-	-	777	577	139	-	410	-
Trinidad and Tobago	1970	17 978	7 135	2 460	8 255	128	-	-	-	-
	1971	16 980	8 155	3 971	4 805	49	-	-	-	-
	1972	16 546	4 179	4 410	2 147	58	1 084	-	-	5 068
Uruguay	1970	1 929	1 177	646	106	-	-	-	-	-
	1971	2 003	1 348	573	82	-	-	-	-	-
	1972	1 794	1 068b/	482b/	244b/	-	-	-	-	-
Jamaica	1970	1 826	-	-	1 826	-	-	-	-	-
	1971	1 758	-	-	1 758	-	-	-	-	-
	1972	1 567	-	-	1 567	-	-	-	-	-
Central America c/	1970	2 600	-	-	2 600	-	-	-	-	-
	1971	2 615	-	-	2 615	-	-	-	-	-
	1972	2 700b/	-	-	2 700b/	-	-	-	-	-
Total	1970	53 179	21 377	7 647	22 463	982	44	98	536	32
	1971	61 780	28 325	10 815	20 819	753	53	27	758	230
	1972	68 061	30 266	9 524	16 988	778	2 171	5	1 739	5 590d/

Source: ECLA, on the basis of official data.

a/ Includes supply from Colombia.

b/ Estimate.

c/ Includes Costa Rica, El Salvador, Guatemala, Honduras and Nicaragua.

d/ Includes a relatively large portion from Indonesia.

/But, the

But, the degree of collective leverage of Latin America's oil-importing countries on the price of internationally traded crude oil should not be assessed on the basis of these proportions. The bulk of oil refining in Latin America takes place in state refineries (tables 11 and 12), and these entities confront the international crude oil sellers as arms-length competitors. On the other hand, the bulk of internationally traded crude oil moves through the integrated channels of the major oil companies without a competitive interface between the oil producing and oil refining segments of the industry. In 1969, the ratio of international arms-length crude oil sales, (i.e., 4,039 millions barrel/day) 13/ to the total volume of crude oil produced for the world market (i.e., 19,500 TBD) was about 21 per cent. In that year, Latin America's crude oil imports, much of which falls in the arms-length category, was about 827 TBD, or roughly one-fifth of the world arms-length crude oil market. In view of the fact that the erosion of world crude oil prices occurs, to a great extent, because of forces operating in this competitive segment of the world crude oil market, Latin America's role has been, and will continue to be, substantial, and not, as many think, the contrary. This leverage on price is, of course, heavily concentrated in the Latin American countries that enter the world crude oil market with absolutely large crude oil purchase contracts in-hand, such as Brazil, for example.

13/ M.A. Adelman, The World Petroleum Market, (Johns Hopkins Press: Baltimore, 1972), p. 90. This is a rough, but convincing estimate of the volume of crude oil traded under arms-length conditions. It includes, however, an unknown volume of crude oil moving between independents under fixed contracts and, so, it is an over-estimate of the real extent of the international arms-length crude oil market on this account.

/Table 11

Table 11

COMPOSITION OF OWNERSHIP IN VARIOUS PHASES OF THE DOMESTIC OIL AND NATURAL GAS INDUSTRIES IN SELECTED LATIN AMERICAN COUNTRIES, 1972

(Per cent)

Country	Company	Production		Oil refining	Marketing	
		Oil	Gas		Oil	Gas
Argentina	YPF	99.3	100.0	71.0	67.0	100.0
	Joint	-	-	-	-	
Bolivia	YPFB	100.0	100.0	100.0	100.0	100.0
	Joint	-	-	-	-	-
Brazil	PETROBRAS	100.0	100.0	91.0	...	...
	Joint			1.3	...	...
Colombia	ECOPETROL	18.0	20.0	60.0	15.0	10.0
	Joint	-	-	-	-	-
Cuba	Empresa Consolidada del Petróleo	100.0	-	100.0	100.0	-
	Joint	-	-	-		
Chile	ENAP	100.0	100.0	100.0	25.0	100.0
	Joint	-	-	-		
Ecuador	CEPE	-	-	-		
	Joint	-	-	-		
Mexico	PEMEX	100.0	100.0	100.0	98.0	87.0
	Joint	-	-	-	-	8.0
Peru	PETROPERU	28.5	...	92.0	95.0	30.0
	Joint	36.0	...	-	-	70.0
Uruguay	ANCAP	-	-	100.0	62.0	-
	Joint	-	-	-	-	-
Venezuela	CVP	2.0	1.1	2.0	23.0	71.0
	Joint	-	-	-	-	-

Source: ARPEL, Datos Estadísticos de las Empresas Petroleras Estatales Latinoamericanas, November, 1973, Vols. I and II.

/Table 12

Table 12

WORLD REFINING CAPACITY BY AREA AND PARTICIPATION OF MAJOR INTERNATIONAL OIL COMPANIES, 1957 AND 1966

	1957			1966										
	Total (TBD)	8 largest companies (TBD)	8 largest companies (%)	Total (TBD)	8 Largest companies (TBD)	8 Largest companies (%)	Esso	Mobil	Shell	SoCal	Texaco	Gulf	BP	CFP
							Percent							
Venezuela/N.A.	1 406	1 346	96	1 989	1 945	98	46	4	36	2	3	5	0	0
Other Latin America	1 238	363	29	2 294	773	34	9	0	7	0	15	2	0	0
Persian Gulf	1 145	1 064	93	1 662	1 363	82	7	4	4	13	13	10	30	2
Other Middle East	116	23	20	293	117	40	1	16	8	4	4	4	2	2
North Africa	77	14	18	303	47	15	5	1	3	0	0	0	1	4
Other Africa	21	21	100	402	274	68	3	12	20	5	6	0	20	2
Australia, N.Z., Malaysia	257	242	94	758	632	83	6	14	26	7	7	0	22	0
Japan a/	430	101	23	2 211	482	22	5	3	5	4	4	0	0	0
Japan b/	...	...	...	2 211	1 125	51	...	...	...	...	...	...	...	...
Other Asia	401	330	82	986	345	35	14	5	7	3	3	2	1	0
European Economic Community	2 083	1 433	69	6 551	3 858	59	16	4	16	2	3	1	9	7
Other Europe	820	529	65	2 976	2 030	68	22	3	20	2	2	1	18	0
Total World	7 994	5 465	68	20 426	11 867	58	16	4	15	3	5	2	9	3

Source: The table was taken in its entirety from: M.A. Adelman, The World Petroleum Market (Johns Hopkins Press: Baltimore, 1972), p. 96.

a/ Including ownership shares in joint ventures.

b/ Including crude supply rights in excess of ownership rights.

/2. Recent

2. Recent crude oil prices

What has been the trend in the FOB price of internationally traded crude oil since the late-fifties; and what have been the key forces underlying this pattern?

To approach this question, one needs a measure of the trend in the price of crude oil traded under arms-length, competitive conditions (i.e., a market price). Posted prices are useless for this purpose: on the one hand, they are an accounting device for calculating host government revenues and, on the other hand, they are often used to book the price of crude oil sold from a producing to a refining affiliate of an international oil company.

Since 1958, two trends are evident in the evolution of the market price of internationally traded crude oil: first, between 1958-1970, it declined consistently, but gradually; and, second, since then, it has increased sharply.

The pattern of the market price of Saudi Arabian crude oil during this period is revealing in this regard: as shown in table 13, between 1958-1970, that price declined by 35 per cent (i.e., by 3.2 per cent per annum) 14/ from US$ 1.93 to US$ 1.26/barrel. In January 1974, that price, at about US$ 7.65/barrel, was unprecedently high, and, as noted previously, far above its estimated long-run supply cost.

With regard to the first trend, what were the key factors underlying the progressive closure of the gap between the market price of crude oil and its long-run supply cost between 1958-1970?

14/ This 3.2 per cent per annum decline in price is measured in current dollars. The increase in world prices recorded during this period, implies an even sharper decline in the real price of internationally traded crude oil. For example, the price of exports from the developed countries, as reported in International Financial Statistics (IMF), increased by 1.3 per cent per annum during 1958-1970. For a further discussion of this general topic refer to the following source: ECLA, Economic Survey for Latin America, 1973, publication No. 74-40579, Vol. I, Part I, Chapter 7.

/Table 13

Table 13

EVOLUTION OF ARABIAN LIGHT CRUDE OIL PRICES, 1955-1973

(US$ per barrel)

Date	Posted price	Estimated market price	Estimated tax-paid costs a/	Estimated margin on tax-paid costs	Discount off posted prices
January 1					
1955	1.93	1.93	1.07	0.86	-
1956	1.93	1.93	1.07	0.86	-
1957	1.93	1.93	1.06	0.87	-
1958	2.08	1.83	1.15	0.68	0.25
1959	2.08	1.70	1.15	0.55	0.38
1960	1.90	1.53	1.03	0.50	0.37
Opec					
1961	1.80	1.45	0.98	0.47	0.35
1962	1.80	1.42	0.98	0.44	0.38
1963	1.80	1.40	0.98	0.42	0.40
1964	1.80	1.33	1.009	0.32	0.47
1965	1.80	1.33	1.013	0.32	0.47
1966	1.80	1.33	1.017	0.31	0.47
1967	1.80	1.33	1.017	0.31	0.47
1968	1.80	1.30	1.014	0.29	0.50
1969	1.80	1.28	1.021	0.26	0.52
1970	1.80	1.26	1.028	0.23	0.54
1971	1.80	1.33	1.108	0.22	0.47
Teheran					
1972	2.285	1.75	1.444	0.31	0.54
1973	2.591	2.20	1.625	0.57	0.39
April 1	2.742	2.30	1.716	0.58	0.44
June 1	2.898	2.70	1.811	0.89	0.20
August 1	3.066	2.85	1.913	0.94	0.22
October 1	3.011	3.00	1.879	1.12	0.01
Kuwait					
October 16	5.11	3.65	3.15	0.50	1.46
January 1 1974	11.65	7.65	7.15	0.50	4.00

Source: Reproduced in its entirety from: IBRD, Public Utilities Department, The Changing Energy Scene, P.U. Note No 7, draft dated december 17, 1973, Table 1 (page not numbered).

a/ Approximately equal to "Government take" (taxes plus royalties) minus production costs of about $0.15 per barrel.

/The following

The following factors appear to have been particularly important: first, the growth in the number of independent crude oil supplying companies selling crude oil in the world market; second, the increase in the number of large, independent refiners (state, private, and mixed) in the oil-deficit countries buying crude oil in the world market; and, third, the closure of the US crude oil market to unlimited crude oil imports, and particularly to imports of crude oil from Middle Eastern sources. These forces reduced the control of the major international companies over the market price of oil and progressively eroded the crude oil price/cost gap. On the other hand the continuing, absolute dominance of the majors in the international oil market tempered the rate of price erosion during this period.

In 1950 and in 1957, the eight major international oil companies accounted for roughly 99 per cent and 84 per cent respectively, of the crude oil produced in the major crude oil exporting countries of the world. By 1969, this share had declined to about 80 per cent.15/ Adelman calculates that, between 1957-1969 (first half), the concentration ratio for the eight largest oil companies in the world's major oil exporting countries declined from 0.13 to 0.10; that is to say, that, in 1957, these eight companies were the equivalent of about 7.6 equal-sized companies, and, by 1969, the comparable figure was 9.6.16/

These figures reflect the entry into the world crude oil producing industry of new companies: these included not only international oil companies, but foreign governments, a variety of consortia, and the host oil governments themselves as well. This entry process stimulated the growth in the arms-length component of the world crude oil export market from 6.9 per cent in 1950, to

15/ M.A. Adelman, The World Petroleum Market (Johns Hopkins Press: Baltimore, 1972), pp. 80-81. The eight companies are: Esso, Mobile, Socal, Texaco, BP, Gulf, Shell, and CFP.

16/ M.A. Adelman, The World Petroleum, (Johns Hopkins Press; Baltimore, 1972), p. 81, The "concentration ratio" is the reciprocal of the sum of the squared market percentages of the firms in the market.

/17.7 per

17.7 per cent in 1957, and to 20 per cent in 1968.17/ In short, the high price (relative to long run supply cost) of internationally traded crude oil induced an increase in its supply, not only within the circuits of the major oil companies, but, proportionally more rapidly, outside of those circuits as well; and this process exerted a strong downward pressure on crude oil prices.

Related to this increasing entry in the crude oil production segment of the world oil industry, there was a parallel growth in refining capacity outside the orbit of the major oil companies. To a great extent, this growth reflected the rapid increase in world oil consumption coupled with the commitment in many countries to nationally owned refineries. Between 1957-1966, the share of the eight largest oil companies in the total refinery crude runs (excluding the USA and Communist countries) declined from 67.4 per cent to 61.6 per cent. As shown in table 12, Latin America (excluding Venezuela N.W.I.) increased its refining capacity by 85 per cent during 1957-1966, and, in 1966, the region's dependence on the eight large oil companies was far below the world average. The decline in this latter ratio from 68 per cent in 1957 to 58 per cent in 1966 mirrors the growing competition in the world crude oil market during this period and the strong downward pressure on price associated with it.

In 1959, after the failure of the voluntary import controls, the US crude oil market was sealed off from competition by the imposition of a mandatory crude oil import restriction scheme. In the present context, one major effect of this programme was to increase the downward pressure of crude oil supply on price in markets outside the United States.

If the increasing force of competition was exerting a strong downward pressure on crude oil export prices during 1958-1970, the continuing dominance of the eight largest international oil companies was moderating the rapidity of the price decreases. The mechanism is not difficult to identify; when a small crude oil selling company

17/ M.A. Adelman, The World Petroleum Market, (Johns Hopkins Press: Baltimore, 1972), p. 90.

/considers reducing

considers reducing price, it does so in the expectation of significant penetration into otherwise unattainable markets; and the price reduction on its existing market, which will eventually emerge, can be offset by the large additional sales (at a price far above cost) that it expects to achieve by cutting price. In comparison, when a large international oil company considers a price reduction (to add to sales or to prevent their loss), it must consider the negative financial impact that the price reduction will have on the whole block of its existing sales. So, with crude oil export prices far above costs, the small companies are typically more eager than the large to cut price for immediate gain.

The downward trend in crude oil export prices was reversed in mid-1970. Several factors combined to place the OPEC countries in a strong bargaining position: the closure of the Suez canal followed by the closure of the Trans-Arabian pipeline, cutbacks in Libya's crude oil exports, the pressure of low oil inventories of Europe, the rapid growth in world oil demand, and the relatively high concentration in a few countries of the world's proven reserves of oil available for export. They exploited this position skillfully, with little in the way of effective resistance from the oil companies or the oil-deficit governments.

A series of agreements (i.e., Teheran, 1971; Geneva 1972; post-Geneva, 1973; and the participating agreements, 1973) were negotiated between host governments and the oil companies which drove up posted crude oil prices and government revenue per barrel. Additionally, the host government participation rights were strengthened and compensation was agreed on for currency revaluations and for inflation. As shown in table 13, between (average) 1971-August 1 1973, the posted price of Saudi Arabian light crude oil increased by 71 per cent: from US$ 1.80 to US$ 3.07 per barrel; and government revenue per barrel increased from about US$ 0.96 to US$ 1.73 per barrel.

In September, 1973, the fourth Arab-Israeli war erupted, and the previously prevailing state of expectations on oil prices and security of supply was thrown into instant confusion.

/In October

In October, 1973, the Teheran Agreement was effectively terminated. The governments of Iran, Saudi Arabia, Kuwait, Abu Dhabi, Qatar, and Iraq defined the "market price" (FOB) of Saudi Arabian light crude oil at US$ 3.65 as of October 16. Additionally, they made future levels of posted crude oil prices a function of future market prices, which they were to define. Saudi Arabian light was to be the pivot crude oil, on which the posted and market prices of other crude oils would be based. The posted price (FOB) of Saudi Arabian light increased from US$ 3.01 (October 1) to US$ 5.11 (October 6), and government per barrel revenue from US$ 1.73 to US$ 3.00.

In December, 1973, the governments of the same six Middle Eastern countries announced that, effective January 1, 1974, the new posted price of Saudi Arabian light would be US$ 11.65, or 128 per cent above the level on October 16, 1973. Moreover, government revenue per barrel was set at US$ 7.00, six-tenths of the new level of posted prices: in short, between October 1972, and January 1974, government revenue per barrel had increased by 133 per cent. These new price and revenue levels were generalized, after adjustments for inherent yield, quality, sulphur and freight differentials, to the crude oils of the world's oil-exporting countries. The new crude oil export price structure was to remain in effect for three months, to March 31, 1974.

On March 17, 1974, the oil ministers of the OPEC countries announced, in Vienna, that the posted and market prices for their crude oils existing on March 31 would continue for another three months, from April 1 to June 30, 1974. In June, the OPEC oil ministers met in Quito, Ecuador to review the prices of crude oil for the third quarter of 1974. They decided to maintain through end-September the current structure of posted prices for world crude oil (based on the US$ 11.65/barrel posted price of Saudi Arabian light). Eleven of these twelve government, Saudi Arabia dissenting, also agreed to increase by two percentage points the royalty charge on crude oil exported from their countries by international oil companies, this increase to be

/effective on

effective on July 1, 1974. One observer estimates that this will increase the price of crude oil exported from these eleven countries by about US$ 0.11 per barrel.18/

Two other major developments bearing on the price of internationally traded crude oil in recent years have been: first, the increasing ownership rights of host governments in crude oil produced in their countries;19/ and, second, the sharp increase in the price at which international oil companies have agreed to "buy-back" participation crude oil from the host governments. By 1973, for example, governments in the Arab countries had secured ownership rights in the range of twenty-five per cent of crude oil produced in their countries with buy-back prices for participation crude oil that were slightly in excess of tax-paid costs.20/ By comparison, in 1974 BP and Gulf agreed in a path-breaking contract with the government of Kuwait to a 60:40/government: company crude oil participation rights arrangement. Although the buy-back price for this crude oil was not fixed, the government did reject the company's offer of US$ 8.50/barrel 21/ (i.e., 72 per cent of posted price), and it was pressing for 93 per cent of posted price,22/ the price ratio then covering Saudi Arabian buy-back crude oil sales and which was becoming generalized in the Middle East and North Africa. Saudi Arabia, Following the Kuwait lead in this area, has recently called for renegotiation of the participation agreements with the oil companies.23/

18/ Joseph Novitski, "OPEC Raises Royalties on Oil 2 per cent" New York Herald Tribune (Paris edition), June 18, 1974, p.1.

19/ This increased ownership has been achieved through several routes: participation and royalty crude oil, confiscation, and purchase by governments of oil company assets in their countries.

20/ "Changing Ownership of Crude", The Petroleum Economist, March, 1974, p. 85.

21/ Ibid, p. 85.

22/ Petroleum Intelligence Weekly, June 3, 1974, p.2.

23/ Petroleum Intelligence Weekly, May 20, 1974, p.3.

/With host

With host governments selling an increasingly large volume of crude oil back to the producing oil companies at these premium prices the effect is to raise, and provide an umbrella for, the average price of crude oil sold by the international oil companies. Thus, with tax-paid cost to the oil company for Saudi Arabian equity crude oil at, say, US$ 7.15/barrel and buy-back price of US$ 10.83/barrel (93 per cent of posted price) for the remaining 60 per cent of the volume of sales of this crude oil, its average acquisition cost to the oil companies buying it would be US$ 9.36/barrel (i.e., US$ 7.15 (0.4) + 0.93 (US$ 11.65) 0.6); adding another US$ 0.50/barrel for company margin would suggest an average selling price for Saudi Arabian crude oil of US$ 9.86/barrel.

A comparison of the FOB market price of Saudi Arabian crude oil in early 1974, US$ 7.65/barrel (table 13), with the US$ 9.36/barrel figure presented above, shows the strong upward pressure on average market price that is built into the recent developments in the area of participation crude oil sales by the host countries to the oil companies.

3. Summary

Since the late sixties, there have been two critical developments in the market for internationally traded crude oil: first, the reversal in 1970 and the subsequently sharp rise in the price of crude oil traded in the international market; and second, the increasing ownership and control of the oil-exporting countries over the volume of crude oil produced in their countries.

The increased ownership of the host oil countries over indigenously produced crude oil has taken several forms: payments of royalties in oil in lieu of cash, expropriation of oil company properties and, especially in recent years, two other means; the increasing volume of participation crude oil and the purchase of oil company assets in the oil-exporting countries by host governments.

/Taken together

Taken together with the rapid growth in world demand for imported crude oil and the extreme concentration of proven oil reserves in a relatively few countries (about 64 per cent in the Middle East at end-1971), these forces have supported a dramatic transfer in the control over the volume of crude oil traded internationally from the international oil companies to the oil-exporting countries in the profitability of supplying this crude oil (table 6). This shift in ownership and control was accompanied by, and interrelated closely with, the sharp upswing in the price of internationally traded crude oil after 1969.

Chapter II

THE IMMEDIATE ECONOMIC AND FINANCIAL RAMIFICATIONS TO LATIN AMERICA'S OIL-DEFICIT COUNTRIES OF THE CONTINUANCE OF THE WORLD ENERGY CRISIS

Introduction

This chapter explores the immediate economic and financial consequences to Latin American oil-deficit economies of a price for world crude oil in the range of US$ 7.00-US$ 10.00 per barrel (in 1974 prices), FOB, Persian Gulf.24/ By comparison, the market price (FOB) of Saudi Arabian crude oil was about US$ 2.20 per barrel (in current prices) in early 1973.

The analysis focuses on the direct economic and financial consequences as they impact on the following macroeconomic variables in these countries: the general price level, production, employment, and the pressure on foreign reserves. The implications of the energy crisis for international liquidity and immediate economic growth in the region are also discussed.

24/ The use of the US$ 7.00-US$ 10.00 range requires explanation. As shown in table 13, the market price of Saudi Arabian crude oil, FOB, in January 1974 was about US$ 7.65/barrel. Presently, the price is, probably, in the range of US$ 9.00 per barrel. The lower limit figure of US$ 7.00 per barrel would apply to countries which are importing considerable volumes of their crude oil requirements under contracts made prior to the sharp rise in crude oil import prices. These countries would be mixing cheaper crude oil imported under these contracts with crude oil imports acquired at higher, current prices. The US$ 10.00 upper limit would represent a price somewhat above that which would emerge if Saudi Arabian crude oil, the pivot world crude oil, were sold under a 40:60 company:government participation agreement, with a buy-back price of 93 per cent of posted price, a tax-paid cost of US$ 7.15 per barrel, and an average oil company margin of US$ 0.50 per barrel; this would yield an average price of US$ 9.86 per barrel (i.e., [US$ 7.15 (0.40) + US$ 11.65 (0.93) (0.60)] + US$ 0.50 = US$ 9.86). The US$ 10.00 figure is taken as a price above which, it is assumed, the major crude oil export countries would expect massive substitutions working to their financial disfavour.

/The analysis

The analysis is static in character. It examines the impact of the increased price of imported crude oil on each of these variables separately, step by step. It does not include a dynamic approximation of the impact of the increased price of oil on these variables, taken jointly, for any one of the region's nineteen oil-deficit countries. This would be desirable, but, given the lack of the requisite statistical data, the number of countries involved, and the timing of the Symposium, a formal mathematical approach of this sort is simply not possible. Instead, rough calculations are presented that suggest the range of change that can be expected in certain critical variables such as the price of refined oil products, the degree of direct and indirect upward pressure on the general price level, the range of the direct increase in the price of various classes of domestically produced goods and services, the likely oil import bill for specific oil-deficit countries, and the degree of pressure on their foreign reserve position. The supporting papers provide additional, and more detailed, quantitative perspectives, but, again, using static frameworks of analysis.

The discussion of the impact of the increased price of imported crude oil on domestic prices is the entry point of the analysis. This discussion proceeds in two steps: the first examines the impact of the increase in the price of imported crude oil on the price of refined oil products, and, then, on the price of fuels in Latin America's oil-deficit countries; and the second examines the consequences of the increased price of domestic fuels on the general price level, on the price of specific classes of products and, then, on production, employment, and on the foreign reserve position of the region's oil-deficit countries.

Chapter II closes with a review of the world energy crisis from the point of view of the international economy and a discussion of the basic economic implications of the crisis for Latin American economies.

/1. The

1. The price of refined oil products

To the extent that the increased cost of imported crude oil is passed on to domestic refiners, it constitutes an immediate increase in their variable costs, and on a scale that cannot be absorbed by them financially, given the structure of refined product prices in the domestic market. If the supply of refined oil products is to continue, the domestic price structure for these products must rise, or, if this increase is mitigated, in whole or in part, by public policy, subsidies must be extended to the oil refining industry, either in the form of special oil import exchange rates or by covering refinery financial deficits, or by a combination of both. Alternatively, if governments choose to mitigate the increase in, or freeze, the market price structure of refined oil products, this can be done by reducing tax revenues on these products as a counterbalance, in the aggregate, to the increment in crude oil import costs. In discussing the macroeconomic implications of the increased cost of imported crude oil, it will be assumed that the increased cost of imported oil is passed forward to consumers of refined oil products.25/

However, this assumption alone is not sufficient to approach an analysis of the macroeconomic implications of the postulated increase in the cost of crude oil to the region's oil-deficit countries. For this, one also needs to specify how the domestic price of refined petroleum products will change in response to the increase in the cost of imported crude oil.

Oil refining is an industry of joint costs. Since refiners cannot assign a marginal cost (either financial or economic) to ca a change in the production of any one refined product, production decisions by private refiners turn on a comparison of total incremental revenues and total incremental costs. Where the State is in the domestic refining business, as a monopolist or otherwise, public

25/ The discussion of policy options with respect to fuel pricing for confronting the increased cost of imported crude oil is reserved for later discussion.

/policy on

policy on the pricing of refined products may not be oriented to financial flows, with subsidies to state and/or private refiners being extended to close the gap between cash inflows and outflows of refiners. But, the state refiner can no more calculate a cost for the production of a specific refined product than can the private refiner. Assignation of costs in the oil refinery business to a specific refined product is a logically arbitrary operation.

With no guidance from the point of view of costs, what can be said about the pattern of price increases for refined oil products in Latin America's oil-deficit countries?

As opposed to what one believes should be the allocation of industry costs and taxes to refined products in response to the increased cost of imported crude oil, it is instructive to see what the pattern of these allocations has been in the recent past. Statements of refining and marketing costs reflect price policy at the oil industry level (public, private, and mixed), and the imposition of taxes is a clear reflection of public policy, without the cover of bookkeeping. And, if the State controls the structure of refined product prices (either directly or indirectly), the actual structure of refined product prices is really the publicly approved structure.

The data in table 14 show the key features of industry cost allocation and tax incidence as well as the price of four major refined petroleum products in five oil-deficit countries in 1972.26/

26/ In 1972, these four products accounted for about 97 per cent of total refined product consumption in energy applications in the five countries covered. Additionally, these five countries (i.e., Argentina, Brazil, Chile, Mexico and Peru) accounted for 85 per cent of the volume of oil consumed in 1972 in the region's oil-deficit countries.

/Table 14

Table 14

COUNTRY STRUCTURES AND WEIGHTED AVERAGE COUNTRY STRUCTURE OF INDUSTRY COST ALLOCATION, TAX INCIDENCE, AND PRICE FOR FOUR REFINED OIL PRODUCTS IN FIVE LATIN AMERICAN COUNTRIES, 1972

(Per cent and $/litre as shown)

Country	Motor gasoline	Kerosene	Gas and diesel oils	Fuel oil	Total
	A. Structure of industry cost allocation: Per cent				
Argentina	30.3	29.2	27.0	13.5	100.0
Brazil	35.0	32.7	24.2	8.1	100.0
Chile	29,4	19.9	28.7	22.0	100.0
Mexico	60.7	12.1	19.3	7.9	100.0
Peru	37.0	14.5	29.3	19.2	100.0
Weighted average	43.7	19.5	25.1	11.6	100.0
	B. Structure of tax incidence: Per cent				
Argentina	52.2	20.3	26.1	1.4	100.0
Brazil	49.0	17.7	33.1	-	100.0
Chile	65.6	6.4	17.8	10.2	100.0
Mexico	59.7	12.4	19.9	8.0	100.0
Peru	88.1	2.7	5.5	3.7	100.0
Weighted average	57.4	12.8	26.4	3.5	100.0
	C. Prices of refined oil products: $/litre				
Argentina	8	5	5	2	
Brazil	15	11	10	2	
Chile	8	3	5	4	
Mexico	8	2	3	1	
Peru	6	2	3	2	
Weighted average	11	4	6	2	

Sources: Argentina: Cost, tax, and price data as per Decreto 5940 in force from December 15, 1971 to October 9, 1972. Brazil and Chile: data taken from Instituto Argentino del Petróleo, Petrotecnia, Nº 1, January, 1973, p. 28. Mexico: data taken from Instituto Argentino del Petróleo, Petrotecnia, Nº 8, August, 1973, p. 43. Peru: data taken from PETROPERU, Mercado de Hidrocarburos, Precios de Derivados en el Mercado Interno, (prepared for XVIII meeting of ARPEL experts, Quito, Ecuador, May, 1974), Tables 15, 15a and 15b (pages not numbered).

Notes: Motor gasoline includes regular grade only. Kerosene includes domestic kerosene only. In the case of Brazil, Chile, Mexico and Peru, fuel oil refers to "heavy" fuel oil, but in the case of Argentina, it refers to "fuel oil mercado". The figure for gas oil and diesel oil, in the case of Argentina, is a consumption-weighted average of the prices of these two fuels. In the case of the other four countries, the prices of gas oil and diesel oil were identical and required no such weighting.

The "weighted average" structures of cost allocation and tax incidence are the result of weighting separately the cost and tax structures for each country in two ways: first, weighting them separately by the share of each country in the consumption of each of the four refined products, and second, weighting them separately by the share of each of the four refined products in the total consumption of those four products in each country. In this manner, the weighted average figures were weighted for each country and for each refined product.

A. The "weighted average" price for each refined oil product is the result of weighting the price of each refined product by the ratio of consumption of that product in a given country to the total consumption of that product in the five countries covered.

B. Prices of refined oil products in 1972 in local currency were converted to US$ equivalents using the average, official rate of exchange for that year as reported in: The International Monetary Fund, International Financial Statistics, June, 1974. In the case of Argentina, the "trade conversion factor" for 1972, as reported in the same source, was applied.

/First, motor

First, motor gasoline bears the major burden of industry costs and taxes in each of the five countries covered in the table. Moreover, the comparative burden on motor gasoline, in both respects, is severe. The share of motor gasoline in the weighted industry cost allocation for the five countries shown in table 14 (i.e., 43.7 per cent) was 3.8 times higher than the comparable share of fuel oil (i.e., 11.6 per cent); and motor gasoline's share in the weighted tax incidence for these same five countries (i.e., 57.4 per cent) was 16.4 times higher than that of fuel oil's (i.e., 3.5 per cent).

Second, from the point of view of industry impact, the structure of industry cost and tax allocation in each country is especially discriminatory against road and rail transport (i.e., motor gasoline and diesel oil) and, relatively speaking, it discriminates heavily in favour of the fuel oil-consuming industrial sector, the thermal power industry, the output of which, in turn, is heavily geared to industrial consumers,27/ and the household sector (i.e., household kerosene).

Third, the allocation of industry costs and taxes to refined oil products varies, more or less, with their individual short-run price elasticities of demand. Motor gasoline and diesel oil, with, presumably, relatively low price elasticities of demand in the short-run, have the highest allocation of industry, costs and taxes. Fuel oil, on the other hand with, presumably, a higher short-run price elasticity of demand, has the lowest assignation of industry costs and taxes.

Fourth, there is a wide variation among countries in the level and structure of refined oil product prices as well as in the component patterns of cost assignation and tax incidence. Thus, there is a wide dispersion about the weighted average figures shown for prices, costs and taxes.

27/ In 1973, for example, preliminary figures indicate that industry and mining accounted for about 55 per cent of regional electricity consumption, net of losses. (Refer to table 15.)

/Table 15

Table 15

GENERATION AND CONSUMPTION OF ELECTRICITY IN SELECTED LATIN AMERICAN COUNTRIES, 1972

(Units as indicated)

Country	Total generation (10^6 kWh)	Consumption (10^6 kWh)				Consumption (% of generation)			
		Residential and commercial	Industrial	Others	Losses	Residential and Commercial	Industrial	Others	Losses
Argentina	25 373	7 984	11 206	2 866	3 317	31.5	44.1	11.3	13.1
Bolivia	874	188	502	80	104	21.5	57.4	9.2	11.9
Brazil	57 600	16 100	25 000	6 700	9 800	28.0	43.4	11.6	17.0
Chile	8 934	1 606	5 316	1 036	976	18.0	59.5	11.6	10.9
Colombia	11 315	4 570	4 091	1 043	1 611	40.4	36.2	9.2	14.2
Costa Rica	1 224	534	495	27	168	43.6	40.5	2.2	13.7
Cuba	...	...	...	...	...				
Ecuador	1 118	477	375	104	162	42.7	33.5	9.3	14.5
El Salvador	814	350	268	70	126	43.0	32.9	8.6	15.5
Guatemala	875	275	371	105	124	31.4	42.4	12.0	14.2
Guyana	339	87	210	7	35	25.7	61.9	2.1	10.3
Haiti	164	42	70	12	40	25.6	42.7	7.3	24.4
Honduras	394	114	163	24	93	28.9	41.4	6.1	23.6
Jamaica	1 982	482	1 194	97	209	24.3	60.2	4.9	10.6
Mexico	35 085	5 054	21 395	3 563	5 073	14.4	61.0	10.2	14.4
Nicaragua	726	246	314	89	77	33.9	43.2	12.3	10.6
Panama	1 060	569	197	98	196	53.7	18.6	9.2	18.5
Paraguay	279	97	122	22	38	34.8	43.7	7.9	13.6
Peru	6 154	1 383	3 830	445	496	22.5	62.2	7.2	8.1
Dominican Republic	1 195	458	312	103	322	38.3	26.1	8.6	27.0
Trinidad and Tobago	1 308	286	848	10	164	21.9	64.8	0.8	12.5
Uruguay	2 382	1 292	740	79	271	54.2	31.1	3.3	11.4
Venezuela	15 029	3 088	7 338	1 914	2 689	20.6	48.8	12.7	17.9
Latin America	174 224	45 282	84 357	18 494	26 091	26.0	48.4	10.6	15.0

Source: ECLA, on the basis of official documents.

/Table 16

Table 16 presents an estimate of the change in the price of the four major refined oil products associated with the postulated changes in the cost of imported crude oil. The major assumptions underlying these calculations are the following: First, the cost of imported crude oil increases from US$ 2.20 per barrel in early 1973 to US$ 7.00 and US$ 10.00 per barrel, FOB, Persian Gulf, in 1974; second, the average final market value per barrel of crude oil in 1973 in the region's oil-deficit countries falls within the estimated minimum-maximum range as presented in table 7, third, the change in each of the two estimates of 1973 final market value per barrel of crude oil (i.e., US$ 6.42 and US$ 8.55 per barrel) is limited to the following items: (a) the cost of the crude oil (FOB, Persian Gulf), (b) the change in taxes triggered by that change in crude oil cost, and, here, it is assumed that oil taxes are levied on an ad valorem basis; and, (c) that the average rate of profit (i.e., 15 per cent) on the value of sales less taxes is applied to the increased base occasioned by the increased cost of crude oil. Fourth, per barrel costs of freight, insurance, refining, and marketing do not change, by assumption, in order to isolate the impact on refined product prices occurring uniquely due to the increased cost of imported crude oil. Fifth, the increment in final market value, in the 1973 minimum and maximum cases presented in table 16, is allocated to refined products by holding constant the 1972 weighted average allocation structures of industry costs and taxes shown in table 14, and the resulting price increases are added to the weighted average prices for each refined product in 1973 as shown in that table.28/ Sixth, in calculating the increment in refined product prices, it is assumed that domestically produced crude oil is priced at its opportunity cost, a figure which varies, of course, between countries.

28/ Given the wide dispersion about the weighted average price, cost, and tax data for these five countries (table 14), this approach imparts a considerable loss in generalizing power. The figures presented in table 17 on the prices of refined oil products in 1974 should be read with this pattern of country dispersion in mind.

/Table 16

Table 16

ESTIMATED RANGE OF INCREASE IN THE PRICE OF SELECTED REFINED OIL PRODUCTS, 1973-1974, IN LATIN AMERICA'S OIL-DEFICIT COUNTRIES

(Units as indicated)

A) Final market value, early 1973 ($/bbl.)	$ 6.42		$ 8.55	
B) Final market value, avg. 1974 ($/bbl.)	12.76	16.73	16.28	21.11
C) Cost of crude oil, 1974 ($/bbl.)	7.00	10.00	7.00	10.00
D) Increase in price of refined products, 1973-1974 ($/litre):				
Motor gasoline	0.05	0.08	0.07	0.11
Kerosene	0.13	0.20	0.14	0.24
Diesel and gas oil	0.04	0.07	0.05	0.08
Fuel oil	0.01	0.02	0.02	0.02
E) Weighted average structure of prices, 1972-1973 ($/litre):				
Motor gasoline	0.11			
Kerosene	0.03			
Diesel and gas oil	0.07			
Fuel oil	0.02			

Notes: Lines A, B, and C refer to table 7..

Line D: These price increases were derived by passing on the increased cost of imported crude oil (using Saudi Arabian light, FOB Persian Gulf, as the base (see table 7)) to domestic consumers of refined oil products in accordance with the weighted average systems of cost and tax allocation prevailing in 1972, as shown in table 14, allowing for a mark-up on the increased cost of that crude oil.

Line E: The local currency prices of the four refined products for Argentina, Brazil, Chile, Mexico and Peru were taken from the same sources as noted in the footnote in table 14. These prices were converted to dollar equivalents, using official rates of exchange in effect at the time of the price datum for each country. The price of each refined product in each country was then weighted for the share of consumption of that product in the total consumption of the four products in the five countries. The resulting volume-weighted structure of refined oil products, which is based largely on 1972 data (but including 1973 data as well), was taken as a representative structure for the situation in early 1973.

The sharp increase shown above for kerosene does not mean that the prices indicated for that refined product (or any others, for that matter) will necessarily emerge. It simply reflects the change in price that would occur if the increased cost of crude oil were passed forward to consumers within fixed (weighted-average) systems of industry cost allocation and tax incidence. Because of its relatively low share in refined product consumption in the four countries covered and the large absolute increases in costs and taxes it bears, the price of kerosene jumps sharply. Price policy may, in fact, not permit such a sharp increase in the price of kerosene, allocating to motor gasoline and other products some of the cost and tax burden that would fall on kerosene if the previous system of cost and tax allocation were retained.

/The cost

The cost of imported crude oil (CIF) is taken as a rough approximation of the opportunity cost of indigenously produced crude oil. Insofar as this measure ignores the role of differential transport costs in establishing the structure of export prices for indigenous crude oil, it is a biased estimator. But, for present purposes, the distortion introduced is not prohibitive.

Summarized in table 17 are the prices of the four major refined oil products associated with the case in which the cost of imported crude oil increases from US$ 2.20 per barrel, in early 1973 to US$ 7.00 and US$ 10.00 per barrel in 1974. These prices are presented for the minimum and maximum cases of the final market value of a barrel of crude oil in 1973 as shown in table 7, (i.e., US$ 6.42 and US$ 8.55, respectively).

Table 17

PRICES OF SELECTED REFINED OIL PRODUCTS ASSOCIATED WITH DIFFERENT LEVELS OF FINAL MARKET VALUES OF A BARREL OF CRUDE OIL IN THE DOMESTIC ECONOMY, 1974

(In units as indicated)

Final market value, early 1973 (US$/barrel)	US$ 6.42		US$ 8.55	
Final market value, average 1974 (US$/barrel)	12.75	16.73	16.28	21.11
Cost of crude oil (FOB Persian Gulf), (US$/barrel)	7.00	10.00	7.00	10.00
Price of refined oil products (US$/litre), 1974:				
Motor gasoline	0.16	0.19	0.18	0.22
Kerosene	0.17	0.24	0.18	0.28
Diesel Oil	0.10	0.13	0.11	0.14
Fuel Oil	0.03	0.04	0.04	0.04

Source: Table 16.

/These summary

These summary figures prompt several observations:

First, because of the low absorption of costs and taxes taken jointly with its relatively high weight in the consumption of refined oil products, the price of fuel oil is not significantly changed as the cost of crude oil increases to US$ 7.00 and US$ 10.00 per barrel. In comparison with its price in early 1973, US$ 0.02/litre, the price of fuel oil rises to US$ 0.03-0.04/litre at a US$ 7.00/barrel crude oil cost and to US$ 0.04/litre at a US$ 10.00/barrel crude oil cost. Clearly, price increases on this order would not constitute a significant depressant on the consumption of fuel oil.

Second, and at the other extreme, because of the small share of kerosene in the structure of final product demand and its relatively large share in allocated costs and taxes, the increase in the price of kerosene is comparatively sharp. If the cost of crude oil rises from US$ 2.20 to US$ 7.00/barrel, then the price of kerosene falls in the range of US$ 0.17-US$ 0.18/litre. Alternatively, if the cost of crude oil rises to US$ 10.00/barrel, the price of kerosene falls in the range of US$ 0.24-US$ 0.28/litre. At these prices, one would expect restrictions by many consumers in their purchases of kerosene in many oil-deficit countries, and, particularly, by lower-income families living in rural areas.

Third, falling between the extremes of fuel oil and kerosene, lie the new prices of motor gasoline and diesel oil. At US$ 7.00/barrel, the price of gasoline would range between US$ 0.16-US$ 0.18/litre, and, at US$ 10.00/barrel, the range would be US$ 0.19-US$ 0.22/litre. In the case of diesel oil, the comparable ranges are US$ 0.10-US$ 0.11/litre (US$ 7.00/barrel) and US$ 0.13-US$ 0.14/litre (US$ 10.00/barrel). While these higher prices may trigger cutbacks in the consumption of motor gasoline, especially by private households, the degree of this deceleration in any one country, is, of course, a highly speculative matter. The empirical basis simply does not exist to gauge the severity of consumer reaction to these increased price levels.

/But, whatever

But, whatever the reaction it will have its implications for the rate of growth in crude oil imports in countries satisfying domestic oil product requirements by refining imported crude oil. In these countries, refining strategy is typically oriented to minimizing motor gasoline imports. Hence, if domestic consumption of motor gasoline is not significantly reduced by the higher prices for motor gasoline, then governments of oil-deficit countries may find it necessary to increase motor gasoline prices even higher in an effort to reduce, to desired levels, their payments in foreign exchange for imported crude oil.

2. The price of fuels

What effect will the increase in the price of refined oil products have on the price of fuels in the region's oil-deficit countries? This question is taken as logically prior to a more general one: what will be the immediate increase in the general price level in these countries triggered by the increase in the price of imported crude oil?

Of the region's 19 oil-deficit countries, three are completely dependent on imported oil in meeting their total energy requirements (excluding vegetable fuels): Barbados, Cuba,29/ and Cuyana. For these countries, the increase in the market price of oil is the increase in the price of their fuels.

In eleven of the remaining sixteen oil-deficit countries in the region the only energy source used, other than oil, is hydropower. In ten of these eleven countries, imported oil constitutes more than four-fifths of the volume of total energy flows, and, in Costa Rica, it represents about three-fifths of that total. In each of these eleven countries, the increase in the price of refined oil products should also be a statistically close approximation to the increase in the average price of fuels.

29/ Actually, Cuba does produce crude oil, but the volumes involved are negligible. (Refer to table 18).

/Table 18

Table 18

PRODUCTION AND CONSUMPTION OF COMMERCIAL ENERGY SOURCES AND VEGETABLE FUELS IN SELECTED LATIN AMERICAN COUNTRIES, 1972

(10^3 metric tons of oil equivalent at 10 700 Kcal/kg)

Country	Production						Consumption					
	Coal	Crude oil	Natural gas	Hydroelectricity a/	Vegetable fuels b/	Total	Coal	Petroleum products	Natural gas	Hydroelectricity a/	Vegetable fuels b/	Total
Argentina	306	22 653	6 047	433	1 564	31 003	714	21 658	6 285	433	1 564	30 654
Barbados	-	-	-	-	90	90	-	200	-	-	90	290
Bolivia	-	2 082	2 634	232	866	5 814	-	562	28	232	866	1 688
Brazil	1 310	8 352	955	13 756	16 974	41 347	2 472	28 235	198	13 756	16 974	61 635
Chile	940	1 633	6 209	1 563	1 084	11 429	1 091	5 009	469	1 563	1 084	9 216
Colombia	1 685	9 914	2 518	2 248	3 738	20 103	1 685	4 953	1 496	2 240	3 738	14 120
Costa Rica	-	-	-	332	351	683	-	461	-	332	351	1 144
Cuba	-	-	-	-	3 622	3 622	-	7 260	-	-	3 622	10 882
Ecuador	-	3 772	68	138	1 482	5 460	-	1 290	47	138	1 482	2 957
El Salvador	-	-	-	147	694	841	-	580	-	147	694	1 421
Guatemala	-	-	-	85	1 056	1 141	-	830	-	85	1 056	1 971
Guyana	-	-	-	-	307	307	-	480	-	-	307	787
Haiti	-	-	-	27	1 150	1 177	-	130	-	27	1 150	1 307
Honduras	-	-	-	95	530	625	-	410	-	95	530	1 035
Jamaica	-	-	-	38	522	560	-	1 550	-	38	522	2 110
Mexico	2 447	26 241	14 381	4 667	7 294	55 030	3 230	25 013	10 855	4 667	7 294	51 059
Nicaragua	-	-	-	82	445	527	-	520	-	82	445	1 047
Panama	-	-	-	22	200	222	-	600	-	22	200	822
Paraguay	-	-	-	51	476	527	-	210	-	51	476	737
Peru	45	3 158	1 408	1 434	2 0/5	8 120	55	4 740	842	1 434	2 075	9 146
Dominican Republic	-	-	-	22	1 185	1 207	-	480	-	22	1 185	1 687
Trinidad and Tobago	-	7 328	2 129	-	297	9 754	-	1 870	1 881	-	297	4 048
Uruguay	-	-	-	298	110	408	25	1 705	-	298	110	2 138
Venezuela	51	168 628	35 397	1 849	831	206 736	240	9 832	9 532	1 849	831	22 284
Latin America	6 044	253 761	71 746	27 519	46 943	406 813	9 512	118 578	31 633	27 519	46 943	234 185

Source: ECLA estimates.

Note: All figures are provisional.

a/ Hydroelectricity converted to oil equivalent basis using the factor: 1 KWh = 3 200 kcals, which is the estimated average energy input required in Latin American thermal plants to produce one KWh.

b/ Includes only household consumption and sugar plants.

/There are

There are five oil-deficit countries in the region which draw on indigenous reserves of oil, gas, coal, and hydropower in satisfying their (non-vegetable fuel) energy requirements. These countries are: Argentina, Brazil, Chile, Mexico and Peru.

In the other 14 of the region's 19 oil-deficit countries, the heavy reliance on imported oil in the structure of their (non-vegetable fuel) energy consumption, taken together with the relative inability to change this pattern in the near future, makes it very likely that the increase in the price of refined oil products in these countries will be a close approximation to the increase in the price of fuels in them.

To what extent can an increase in fuel prices in the five just cited countries be moderated by a substitution of hydropower, coal, and natural gas for imported oil and of indigenous for imported crude oil supplies?

In the case of hydropower, supplies of this fuel are drawn upon by power companies before other fuels, and, given the lead-time involved in hydropower projects, no significant acceleration can be expected in the supply of this energy source beyond currently planned levels to the end of the decade. Consequently, hydropower cannot be viewed as a marginally significant moderating influence on the upward pressure on fuel prices stemming from the original increase in the price of imported crude oil.

A major, potential source of relief from the increased cost of oil in the electric power industries of the oil-importing countries lies in the conversion of oil-fired thermal power plants, both those already operational as well as those in the pipeline, to indigenous-based fuels, particularly coal and natural gas. Fortunately, as the data in table 19 indicate, plans made in the region's oil-importing countries in the early seventies for expansion of generating capacity through 1980, envisaged a displacement of oil-fired plants by both hydropower and non-oil-fired thermoelectric generating plants.

/Table 19

Table 19

PROGRAMME OF EXPANSION OF INSTALLED GENERATING CAPACITY, BY TYPE OF FUEL, IN SELECTED LATIN AMERICAN OIL-DEFICIT COUNTRIES, 1974-1980

(In MW)

Country	Hydroelectric	Thermoelectric			Other		Total a/
		Oil	Natural gas	Coal	Nuclear	Geothermal	
Argentina	6 680	-	1 200	565	920	-	2 685
Brazil	14 000	1 499	-	-	625	-	2 124
Costa Rica	180	30	-	-	-	-	30
Cuba	...	...	-	-	-	-	...
Chile	820	275	-	360	-	15	650
El Salvador	189	-	-	-	-	33	33
Guatemala	188	157	-	-	-	-	157
Guyana	...	...	-	-	-	-	...
Haiti	...	...	-	-	-	-	...
Honduras	340	24	-	-	-	-	24
Jamaica	-	68	-	-	-	-	68
Mexico	3 300	(1 322)	(3 500)	960	1 340	285	7 407
Nicaragua	-	200	-	-	-	-	200
Panama	470	238	-	-	-	-	238
Paraguay	90	40	-	-	-	-	40
Peru	1 965	216	-	-	-	-	216
Dominican Republic	40	269	-	-	-	-	269
Uruguay	570	375	-	-	-	-	375
Total programme 1974-1980	28 832	4 713	4 700	1 885	2 885	333	14 501
Installed capacity to 1973	21 824	16 157	3 154	1 110	-	(75)	20 496
Total	50 656	20 870	7 854	2 995	2 885	408	35 012

Source: ECLA, on the basis of official information.

a/ Represents sum of thermoelectric, nuclear and geothermal stations.

/What are

What are the possibilities for substituting domestic coal for fuel oil in these five countries as a means of tempering the increase in fuel prices? The prospects seem bleak. There seems to be little, if any, competition in the determination of the price of domestic coal and its oil-based competitor, fuel oil, in these countries. The data in table 20 indicate that the per-unit cost of energy purchased in the form of coal in these countries was higher than that of energy purchased in the form of fuel oil, not adjusting for the advantage which fuel oil has over coal in burning and other sources of efficiency. In short, the relative price of coal to fuel oil is fixed administratively. It is not determined by competitive market forces: if it were, the coal industries of these countries would be under far more severe financial pressure than they are now.

Additionally, given the spread between the price per unit of energy purchased in the form of coal and fuel oil in 1973, the increase in the price of fuel oil in 1973-1974 (table 16: about US$ 0.01-US$ 0.02/litre, or US$ 0.90-US$ 1.80 per million kilocalories) would still place the price of fuel oil in 1974 below the price of domestic coal in the coal producing/oil-deficit countries in the region for which data are available. The implication of this is obvious: even if the price of domestic coal remained constant during 1973-1974, (actually, it has risen sharply), while the price of fuel oil increased by US$ 0.01-US$ 0.02/litre, there still would be no financial incentive for private manufacturers or private thermal power plants to substitute indigenous coal for fuel oil in the region's major coal producing, oil-deficit countries.

In short, the bulk of domestically produced coal in these countries flows to markets protected from price competition: the publicly-owned (or administratively controlled) metallurgical, thermal power, and railroad industries.30/ Private companies simply do not have the financial incentive for substituting out of fuel oil into coal, given coal/fuel oil price relationships.

30/ See Ramón Suárez; The Prospects for Coal in Latin America, (Information document, Nº 3) prepared for this Symposium.

/Table 20

Table 20

PRICES OF FUEL OIL, NATURAL GAS, AND COAL IN SELECTED OIL-DEFICIT COUNTRIES, 1973

(Units as indicated)

Country	Fuel oil					Natural gas			Coal (locally produced)		
	Calorific value (kcals/kg)	Price per kilo		Price: US$ per		Calorific value (kcals/m3)	Price: US$ per		Calorific value (kcals/kg)	Price: US$ per	
		Local currency	US$	Metric ton	10^6 kcals		m^3	10^6 kcals		Metric ton	10^6 kcals
Argentina	10 500	0.26a/	0.026	26	2.48	9 300	0.025b/ 0.012c/	2.69b/ 1.29c/	6 200	37.0	5.96
Brazil	10 500	0.158d/	0.026	26	2.48	9 300	0.015d/	1.61	5 000	38.4d/	7.68
Chile	10 500	1.30e/	0.019	19	1.81	9 300	...	...	6 900	31.0e/	4.49
Mexico	10 500	0.14f/	0.011	11	1.05	9 300	0.0084	0.90	6 300	25.0g/	3.98
Peru	10 500	0.78f/	0.020	20	1.90	9 300	...	...	...	...	...

Source: Fuel oil and natural gas: In the case of Peru, the prices were taken from PETROPERU, op.cit., Table 12. Prices for the four other countries were supplied to ECLA by UN regional offices. Coal: For Brazil, price was taken from: 4º Congresso Brasileiro de Siderurgia, vol. II, p. 24. For Chile, price data were supplied by Cía. Carbonífera de Lota-Schwager. Price data for Argentina, Mexico and Peru were provided by Sr. R. Suarez of ECLA, who obtained them in discussions at the ILAFA Symposium on Coal and Coke in Latin America's Iron and Steel Industry, Caracas, May 1972.

Note: The following exchange rates were used to convert fuel prices in local currency to US$:

Argentina	9.98 pesos	= US$ 1, the trade conversion factor.
Brazil	6.160 cruzeiros	= US$ 1
Chile	70 escudos	= US$ 1
Mexico	12.49 pesos	= US$ 1
Peru	38.70 soles	= US$ 1

Calorific values of fuels estimated by ECLA

a/ June, 1973.
b/ 1972; covers household use up to 200 m^3/day.
c/ 1972; for consumption up to 100 000 m^3/day.
d/ November, 1973 for fuel oil and natural gas; december, 1973 for coal used in the iron and steel industry.
e/ March, 1973. Price at mine.
f/ 1973.
g/ 1972.

/For such

For such substitution to be realized, coal must be channelled to private companies at prices sufficiently below fuel oil to pay-out the costs involved to those incurring them in the conversion from fuel oil to coal. But, even if coal prices were reduced with this in mind, it would not follow that private companies would make the switch from oil to coal. For this to take place, potential coal consumers would also have to expect a continuation in the future of a favourable price of coal relative to fuel oil. Practically speaking, this shift in relative price expectations is not a simple one to effect.

In any event, to what extent can, in fact, the domestic coal industries in these countries increase production now in an effort to displace oil (assuming the proper price incentive and a permissive set of price expectations by potential coal consumers)?

The prospects on this account are quantitatively minor even if, from the public point of view, it were desirable to substitute indigenous coal for oil. A combination of antiquated technology, minimal spare production capacity, and typically difficult extractive conditions renders easy increases in coal supply in the coal industries of these countries more or less out of the question in this decade. Major investments are required in them to increase supply capacity, and the long lead-time between capital investment and increased supply blocks substantive increases in production in the coal industries of these countries in the near future.

The foreign coal market, which, in 1972, supplied about one-quarter of the region's coal consumption, offers little relief to Latin America's oil-deficit countries seeking to substitute coal for oil. The export component of the world coal industry which the United States dominates, is already pushing full capacity, and world coal export prices are rising sharply; and, at present levels, they have probably already eliminated the financial incentive to substitute imported coal for fuel oil throughout the region.

/Plans to

Plans to increase coal production will undoubtedly multiply in Latin America's coal-producing countries. But, significant expansions to present capacity should not be expected prior to the end of the decade. Until then, one can expect: that the initial increase in the cost of internationally traded crude oil will trigger a sharp rise in the price of imported coal; that the (administered) price of indigenous coal will rise under the umbrella of the increased price of imported coal and domestic fuel oil; that relatively minor volumes of coal substitution (largely in publicly controlled industries) will quickly exhaust spare capacity in the domestic coal producing industry, and that private industry will not have the financial incentive to substitute domestic coal for oil; and, finally, that the price of coal will provide little, if any, offset to the increased price of fuels in general in Latin America's oil-deficit countries.

Table 21 indicates the relatively large volumes of natural gas flared in some of the region's oil-deficit/natural gas-producing countries. To these volumes of immediately available supply should be added the additional volumes that automatically will be made available from accelerated production of indigenous crude oil, since oil and gas reserves are often found together in these countries.

Thus, unlike the situation in the case of indigenous coal supply - where the production segment of the industry is the immediate bottleneck to increased supply - the natural gas producing industries in the region's oil-deficit countries can generate significant increases in supply using existing facilities. The major obstacle to the substitution of indigenous natural gas for refined oil products (e.g., fuel oil, kerosene, and, oil-based electric power) appears to be in the marketing segment of this industry, not in production.

Table 21

PRODUCTION AND USES OF NATURAL GAS IN SELECTED LATIN AMERICAN COUNTRIES, 1965, 1970 AND 1972

($M^3 \times 10^6$)

Country	Year	Production	Reinjection a/	Consumed	Flared	Exported	Processed into liquefied gas
Argentina	1965	6 236	230	4 502	1 763	-	-
	1970	7 665	8	6 102	1 598	-	-
	1972	7 862	8	6 235	1 619	-	-
Bolivia	1965	212	76	80	56	-	-
	1970	866	551	39	169	-	-
	1972	3 424	1 575	32	812	1 005	-
Brazil	1965	683	263	90	330	-	-
	1970	1 264	246	118	900	-	-
	1972	1 242	401	228	612	-	-
Colombia	1965	2 658	795	875	...	-	1 337
	1970	2 971	937	1 343	569	-	1 931
	1972	3 274	862	1 721	691	-	1 970
Chile	1965	6 215	4 486	517b/	...	-	4 448
	1970	7 628	4 954	520b/	...	-	4 111
	1972	8 073	3 993	540b/	...	-	4 351
Ecuador	1965	251	...	...	...	-	...
	1970	104	13	66	22	-	172
	1972	88	13	54	14	-	167
México	1965	13 965	1 251	8 930c/	2 813	1 539	-
	1970	18 839	294	12 206c/	4 908	1 260	-
	1972	18 697	396	12 504c/	5 554	243	-
Peru	1965	1 847	439	341	599	-	933
	1970	2 119	205	395	1 033	-	655
	1972	1 831	180b/	420b/	870b/	-	550b/
Trinidad and Tobago	1965	3 263	392	1 174	...	-	273
	1970	3 053	539	1 600	296	-	488
	1972	2 768	261	1 618	397	-	549
Venezuela	1965	40 846	17 720	6 538	16 052	-	536
	1970	48 427	20 110	8 979	18 444	-	881
	1972	46 020	20 514	9 524	14 527	-	1 455
Total	1965	76 176	25 622	23 047	21 613	1 539	7 527
	1970	92 936	27 857	31 368	27 939	1 260	8 238
	1972	93 279	28 203	32 866	25 096	1 248	9 042

Source: ECLA, on the basis of official data.

a/ Includes dry gas in countries where natural gas was processed into liquefied gas.

b/ Estimate.

c/ Includes imported natural gas.

/In some

In some cases, this pressure might be alleviated, however. Additional pumping capacity together with new gas distribution facilities, in some markets, might be a feasible means for substituting natural gas for refined oil products in the relatively near future. Investment might also be feasible, in some areas, to increase gas storage capacity at consumption sites, newly linked to the gas distribution system, and, otherwise unmarketable gas, now available at producing sites, could be pumped during off-peak periods for storage in these facilities for eventual use.31/

But, such investments, even where they are economically defensible, will probably take several years to effect, and, so, this source of relief may be viewed as quantitatively marginal in potential terms for the rest of the decade. Plans made now for incremental natural gas transmission and distribution facilities (as opposed to distribution facilities alone) are virtually impossible to realize physically much before the end of this decade, and substitution potentials requiring such joint facilities, beyond scales already envisaged, can be ignored, for all practical purposes, for the rest of the seventies.

In short, an increase in the demand for natural gas triggered by the increased price of oil products will quickly put a strain on existing natural gas marketing facilities, checking the potential rate of physical substitution of domestically produced natural gas for oil. Otherwise surplus natural gas at production sites, however, will, undoubtedly, find economically useful application, in greater volumes than in the past, in reinjection for oil-well pressure maintenance, as indigenous crude oil production is increased under conditions of rising unit cost.

31/ Liquification facilities at natural gas production sites combined with de-liquification facilities at sites close to markets is an investment alternative to be compared with incremental investment in natural gas transmission facilities. But, for the same reason as presented in the paragraph below, this option will probably not provide much in the way of accelerated substitution potential of indigenous natural gas for oil during the rest of the decade.

/Since the

Since the State controls natural gas tariffs in these five countries, its price does not emerge from competitive forces in the energy markets in which this fuel is sold. The fragmentary figures in table 20 suggest that natural gas is priced below fuel oil, its major competitor on an energy content basis. Given the continuing pressure to conserve foreign exchange in the region's oil producing/oil-deficit countries, this approach to the pricing of natural gas (vis-à-vis fuel oil) will, undoubtedly, continue. Thus, the increase in the price of fuel oil associated with an increase in crude oil cost to US$ 7.00 and US$ 10.00 per barrel, US$ 0.01-US$ 0.02/litre respectively, or US$ 0.90-US$ 1.80/million kilocalories, could be taken as a rough approximation to the upper limit of the increase in the price of natural gas in markets where it competes with fuel oil. Incremental supply costs not covered by this increase will, probably, be passed on to the relatively smaller and more price inelastic household market for natural gas in these countries.

The major source of financial (but, not economic) relief from rising fuel prices in the region's oil-deficit/oil-producing countries appears to lie, not so much in a substitution of indigenous gas, or coal, or hydropower, for oil over the next several years as in a substitution of indigenous for imported crude oil. In the region's five oil-deficit countries, where this substitution potential is immediately present, it is most easily captured when the State is the sole participant in the domestic oil business. The degree of state participation in the major segments of the oil business in these five countries is shown in table 11.

The increased price of imported crude oil constitutes an immediate incentive to produce more domestic crude oil from indigenous proven reserves of crude oil. The economic cost of not producing an additional barrel of indigenous crude oil is given by the cost of importing that barrel. And, once produced, the economic value of a barrel of indigenous crude oil is given by its opportunity cost (i.e., the value of that barrel if sold in the international crude oil market). So, production of indigenous crude oil from state

/facilities can

facilities can be economically defended up to the point that the economic cost per barrel of indigenous crude oil equals the price of a barrel of imported crude oil (CIF) to the domestic refiner.

It is clear that the postulated increase in the price of imported crude oil to US$ 7.00 and US$ 10.00/barrel (FOB, Persian Gulf) between 1973-1974 constitutes a massive stimulus to indigenous crude oil supply in these five countries. Shut-in wells can be brought into production, and virtually all wells can be operated using maximum recovery techniques and, probably, still be profitable from the national point of view. In fact, the major bottleneck to increased indigenous crude oil production during the seventies, from a now-increased level of proven crude oil reserves in these countries, may not stem so much from the additions to cost triggered by increased indigenous crude oil production from existing rigs as from the physical availability and price of required equipment, most of which is imported from oil-equipment supply companies that are probably operating at high-capacity rates.

The increased price of imported crude oil will not only stimulate the time rate of production from (historically) "proven" reserves: it will also provide a stimulus to convert (historically) "probable but not proven" reserves to (revised levels of) "proven" reserves of indigenous crude oil and, then, to produce from them. The simple reality is this: a wide array of crude oil production and development schemes will make sense economically in these five countries, or by them elsewhere, at an economic cost to US$ 7.00-US$ 10.00/barrel (FOB, Persian Gulf), plus transportation and insurance, for imported crude oil. The major obstacle to the implementation of crude oil development projects during the rest of the seventies will probably be the same as in the case of crude oil production projects: the availability and price of the requisite physical equipment from largely foreign oil-equipment supply companies already operating at high levels of capacity.

/When analysis

When analysis proceeds from production and development to the exploration stage of the crude oil supplying industry, the decision to enter or not is heavily contingent on the estimated probability of success in finding crude oil, insofar as it conditions the expected cost of finding new reserves of crude oil relative to the expected cost of developing more proven reserves. But, in the context of the present analysis, the impact of crude oil exploration projects in these countries on the price of their fuels will probably be minor during the rest of the decade; the lead-time involved will probably be too long to make these incrementally lower-cost crude oil flows, if realized, volumetrically too important during this period.

What effect will the increased supply of indigenous crude oil have on the price of fuels in these five countries? By and large, the State is in control of the production and refining segments of the oil business in these countries (table 11). Basically, it can either book its indigenous crude oil at its financial cost into domestic refineries and, by assumption, pass on the lower financial cost of domestic crude oil to domestic consumers of refined oil products; or, it can book domestic crude oil into domestic refineries at the price at which it could sell that crude oil in the export market (i.e., at its opportunity cost, the economic value of that crude oil).32/

The calculations that follow will show the implications for the general price level if the State books its domestically produced crude oil into domestic refineries at its financial cost per barrel, and,

32/ Obviously, the State can book this crude oil into its refineries at prices between its opportunity cost and its financial cost of acquisition. Additionally, the State also has the option of booking domestically produced crude oil into its refineries at levels below the financial cost incurred per barrel to produce that crude oil (i.e., it can subsidize oil consumers, the extent of the subsidy being measured from the opportunity cost of domestically produced crude oil). For purposes of this analysis, it is assumed, however, that, at a minimum, the financial cost of indigenous crude oil supply is passed forward to refiners and, then, to final consumers of refined oil products.

alternatively, at its opportunity cost as well. To the extent, then, that a country can produce indigenous crude oil cheaper that it can import it, that country can potentially reduce the average financial cost of crude oil to its domestic refineries which, it is assumed, will be reflected in a lower refined product price structure than would emerge either in the case of the opportunity costing of domestically produced crude oil, or in the situation where a country is completely reliant on imported oil. Thus, countries like Mexico and Argentina, which are, at present, close to self-sufficiency in crude oil supply, can substantially mitigate the upward pressure on domestic energy prices stemming from the higher cost of imported oil. On the other hand, the other fourteen of the region's nineteen oil-deficit countries, which are completely reliant on imports for their domestic oil supplies, do not have available this means for mitigating the increase in the structure of refined oil produce prices.

By way of summary, then, it is concluded: first, that, in each of the region's nineteen oil-deficit countries, the increase in the price of refined oil products may be taken as rough approximation of the increase in the price of fuels in them; and, second, that in the five oil-producing/oil-deficit countries in the region, the increased price of fuels will be heavily conditioned, in a financial, but not in an economic sense by the degree to which cheaper domestic crude oil can be substituted for more expensive supplies of imported crude oil. Whatever its price in the domestic economy, the economic (net) value of a barrel of indigenously produced crude oil is given by its export price less, of course, any economic costs incurred by exporting it.

3. The general price level

Table 22 presents a rough estimate of the upward pressure on the general price level in 1973-1974 associated with a movement to the highest level of refined product prices under each of the US$ 7.00 and US$ 10.00 (FOB, Persian Gulf), crude oil cost assumptions. In the US$ 10.00/barrel case, this increase occurs as the final market value of a barrel of crude oil increases from US$ 8.55 in 1973 to US$ 21.11 in 1974, and in the US$ 7.00/barrel case, it occurs with a comparable increase from US$ 8.55 to US$ 16.28/barrel. (Refer to table 16.) Other assumptions underlying this estimate, in addition to those specified in tables 7, 14 and 16, are: first, that indigenous crude oil is booked into domestic refineries either at its opportunity cost, on the one hand, or at its financial cost, on the other; and it is assumed that this latter cost does not change significantly during 1973-1974. The second assumption is that the mix of imported and domestic crude oil stays constant during 1973-1974.

These two assumptions impart a bias in the estimated upward pressure on the general price level,33/ only in the case of the five oil-producing/oil-deficit countries in the region. In the near future, since the crude oil-supplying industry is one of increasing costs, the first assumption biases the calculation of the price pressure downward in the case where indigenous crude oil is booked into refineries at its financial cost of supply; and the second assumption imparts a downward (upward) bias to the extent that indigenous crude supplies increase less (more) rapidly than imported oil supplies, again, when indigenous crude oil supply is booked into refineries on a financial basis.34/

33/ Technically speaking, the concept of the general price level used here is not the same as the usual concept. The usual concept is based on a measuring technique which weights the changes in the price of individual products by their share in domestic consumer expenditures. On the other hand, the concept of the general price level employed here weights the changes in the price of specific products by their relative energy content.

34/ Refer to the discussion in the footnotes to table 22 for a more detailed elaboration of the assumptions involved in constructing this table.

/Table 22

Table 22

ESTIMATED IMMEDIATE UPWARD PRESSURE ON THE GENERAL PRICE LEVEL IN THE REGION'S OIL-DEFICIT COUNTRIES FROM AN INCREASE IN THE PRICE OF IMPORTED CRUDE OIL FROM $2.20 IN EARLY 1973 TO $7.00 AND $10.00/BBL (AVERAGE) IN 1974

(1973 = 100)

A		B: Imported crude oil as per cent of crude oil throughput: per cent a/					Estimated (per cent) levels of:		
							Country	A	B
							Argentina	3 - 4	5
Value-added in the energy sector as per cent of total value added		100	75	65	30	5	Brazil	3 - 4	75
							Chile	3 - 4	65
	1	101	101	101	100	100	Mexico	3 - 4	5
							Peru	2 - 3	30
	5	107	106	105	102	100	Others b/	2 - 4	100

Notes: By way of example, the 107 and 106 entries are derived as follows:

$107 = 100\ (0.95) + 100\ (0.05) + 100\ [(1.47)\ (1.00)\ (0.05)];$

$106 = 100\ (0.95) + 100\ (0.05) + 100\ [(1.47)\ (0.75)\ (0.05)].$

The figures presented above assume that the price of imported crude increased by 355% from $2.20 in early 1973 to $10.00 in 1974. This was transformed into a maximum increase in the final market value per barrel of crude oil of 147%, from $8.55 in 1973 to $21.11 in 1974 (table 7). This 147% increase was taken as a rough approximation of the maximum increase in the price of fuels.

The assumption made here that the average cost per barrel of crude oil to domestic refineries is equal to the cost of international crude oil implies that either all crude oil is imported or that indigenous crude oil is sold to domestic refineries at its opportunity cost. If indigenous crude oil is booked to domestic refineries at its financial cost of supply, then the inflationary impact of higher prices for imported crude oil is cushioned to the extent that supplies of cheaper indigenous crude oil are mixed with more expensive imported crude oil.

More specifically, the average cost per barrel (C) of crude oil to domestic refineries is given by the volume of domestic crude oil produced (a) relative to total crude oil throughput (r) multiplied by the financial cost per barrel of domestic crude oil (D) plus the share of imported oil in domestic refinery throughput (1 - a/r) multiplied by the average cost of imported crude (I); or

$$C = \frac{a}{r} D + \left(1 - \frac{a}{r}\right) I, \text{ where } a + (1 - a) = 1$$

Thus, as governments try to increase the volume of domestic crude oil (a), both absolutely and in relation to domestic refinery runs (r) as well, in response to the increase price of I, and with D rising as domestic crude oil production increases (D = f (a), the change in C with respect to (a) is given by:

$$\frac{dc}{da} = \frac{d}{da} \left(\frac{a}{r} D + \left(1 - \frac{a}{r}\right) I\right)$$

$$\frac{dC}{da} = \frac{a}{r} \cdot \frac{dD}{da} + (D - I) \left[\frac{\frac{-adr}{da} + r}{r^2}\right]$$

With I taken as constant at the new level of, say, $7.00/bbl., or $10.00 FOB Persian Gulf, this expression shows that the rate of increase in the weighted average cost of crude oil to domestic refineries will be heavily dependent on the degree to which the financial cost of domestic crude oil rises in response to its increased output. When D = I, there is no longer any mitigation of the inflationary impact by using domestic crude oil. This is the case either immediately if domestic crude oil is priced at its opportunity cost, in which case the entries under the 100% column are relevant or eventually, when, with increasing domestic crude oil production, its increased supply cost equals the price of imported crude oil to domestic refiners. Beyond this point of equality, inflation is associated with higher levels of use of domestic crude oil.

Table 22 (concluded).

In this context, the estimates of the upward pressure on prices presented in this table constitute minimum estimates because they do not include the inflationary effect stemming from the increased cost of domestic crude oil as its production increases: (a) and (D) were held constant in the calculation of the upward pressure on the general price level. Unfortunately, no data were available for any country with which to treat these variables in the estimates of upward pressure on the general price level.

The share of energy in total value-added flows presented in this table are only estimates. The presentation enables the reader to insert his own estimates, if he is in disagreement with those presented here.

The shares of imported crude oil in total refinery runs of the five oil-producing/oil-deficit countries a are based on the data for 1972 (1973 in the case of Mexico) given in tables 35 and 38.

As noted previously, the direct upward pressure on the general price level presented above is based on an increase in the average final market value of a barrel of crude oil from $8.55 to $21.11 during 1973-1974. If that increase were from $8.55 to $16.28/bbl. (with the prise of crude oil FOB rising from $2.20 to $7.00/bbl.) the direct upward pressure on the general price level would be as shown below. The other two cases presented in table 17 (where the final market value of a barrel of crude oil increases from the minimum range level of $6.42 in early 1973 to $16.73 and $12.76 in 1974) generate direct upward pressures on the general price level which are virtually the same as in these two cases, respectively.

		B				
		100	76	65	30	5
A	1	101	101	101	100	100
	5	105	104	103	102	100

Additionally, it should be noted that the figures on upward price pressures in this table refer to the direct upward pressure on the general price level due to the increased cost of fuels: they include only the impact of the increased price of fuels, not the increased price of other inputs which will also rise in price due to the increased price of fuels. These indirect effects on the general price level are also considered in this section. In brief, for countries with a 5% level of energy-intensiveness and facing the maximum level of fuel prices, the upward pressure on prices, taking these indirect effects into account, would rise from 7% to 14%, and for this same group of countries facing the minimum increase in fuel prices, the upward pressure on prices would rise from 5% to 10%.

Finally, these calculations do not take account of pressures on the general price level stemming from changes in the price of any other commodity or from changes in the efficiency with which commodities in general are used in the economy. They are highly approximate in character.

a/ For countries without refineries, the referent is the percent reliance on imported oil products, (i.e., 100%).

b/ Refers to the 14 other oil-deficit/oil-consuming nations in the region.

The figures in table 22 suggest the following basic conclusions:35/

(a) Owing to the combined effect of a relatively high level of energy-intensive economic activity and a high degree of reliance on imported crude oil, Brazil and Chile would face a maximum direct upward pressure on their general price levels of about 4 per cent-5 per cent and 3 per cent-4 per cent, respectively, if the increase in the energy prices were limited to the maximum increase specified, and if domestic crude oil was booked into refineries at its financial cost of acquisition. If, as in the case of some countries, refined product prices were increased more sharply than would be required simply to cover increased crude oil costs, this estimate of direct upward pressure on the general price level would, of course, be exceeded.

(b) Taken as a group, the Caribbean, Central American Republics, Uruguay, and Paraguay would probably face an immediate upward pressure on prices in the neighbourhood of 3 per cent-6 per cent. In these fourteen countries, the upward pressure on prices due to the increased cost of imported oil is significantly moderated by the typically low energy-intensiveness of economic activity in them. While this immediate upward pressure in prices is not an alarming prospect for this group of countries taken as a whole, the implications vary widely between countries: for example, during 1972-1973, Uruguay's consumer price index increased by 119 per cent, in comparison with the increase in the case of Honduras, 6 per cent.

35/ The upward pressure on the general price level being discussed at this point should not be confused with an actual movement in the general price level. The former pressure is being discussed here only with reference to the increased price of fuels while the latter, obviously, reflects all factors impinging on the general level of prices, only one of which is the price of fuels.

/(c) From

(c) From a financial point of view, the remaining three of region's 19 oil-deficit countries will probably experience relatively minor increases in consumer prices due to the assumed maximum increase in the cost of imported crude oil: about 1 per cent in the case of Peru, and virtually zero in the case of Mexico and Argentina, reflecting, by and large, their relative self-sufficiency in crude oil supply, given the assumption that domestically produced crude oil is booked to domestic refineries at its financial cost, not at its opportunity cost.

(d) If domestically produced crude oil is booked into domestic refineries at its opportunity cost, then the immediate upward pressure on prices for the five crude oil-producing/crude oil-deficit countries in the region is also given uncer the 100 per cent column in table 22. In this case, the immediate upward price pressure will be in the range of 3 per cent-6 per cent, for these five countries, as it would be for the remaining oil-deficit countries in the region (see (b) above). It will probably be difficult to reduce substantially the immediate upward pressure on the general price level in these five countries by a substitution of domestic for imported crude oil when the domestic market for refined oil products is growing rapidly. Although domestic crude oil output can be increased in the immediate future in them, strong percentage growth in the domestic market for refined oil products could strain the indigenous crude oil industry's ability to maintain its share in total crude oil requirements. And, as indigenous crude oil output is increased, so will the unit cost of its supply, which, in turn, will increase the extent of inflationary pressure. (Refer to the discussion of this point in the footnote to table 22.)

/(e) Although

(e) Although the immediate inflationary pressure of the increased price of fuels varies country-by-country, the overall pattern of increase for the region's oil-deficit countries does not suggest a case for grave alarm. This would not be the case with oil-deficit countries in the region which, with extremely low reserves of foreign exchange, choose to increase oil prices much higher than those being discussed here in an effort to cut back on imports on oil account.

The estimates of direct inflationary potential presented in table 22 reflect a situation in which the increased cost of crude oil is passed on immediately to domestic consumers within a given system of industry cost and tax allocation.

These estimates relate to the immediate, upward pressure on the general price level due to the increased cost of fuels. They do not include the effect of the increased cost of fuels on the cost of inputs other than fuels into intermediary industries.

Table 23 presents a rough estimate of this indirect, upward pressure on the general price level. The figures in this table show that, at a maximum, with domestic crude booked at its opportunity cost, this indirect upward pressure on prices will probably be about the same order of magnitude as the direct upward pressure: roughly, 7 per cent, given the maximum level of fuel prices and a 5 per cent level of energy-intensiveness; and about 5 per cent in the case of the minimum level of fuel prices and the same level of energy-intensiveness of production.

The direct upward pressure on prices due to the increased cost of fuels is the more significant source of price change for many products. It will occur more or less simultaneously, if increased fuel costs are passed on to consumers. On the other hand, the indirect upward pressure on prices, on the order of 5 per cent-7 per cent for countries with a 5 per cent level of energy-intensiveness of production, will evolve over a longer period of time: say, one or two years. In other words, the annual impact of the indirect pressure on prices is temporally diluted, while the 5 per cent-7 per cent range of direct effect is recorded immediately, and without dilution.

/Table 23

Table 23

DIRECT, INDIRECT, AND TOTAL UPWARD PRESSURE ON THE GENERAL PRICE LEVEL DUE TO THE INCREASED PRICE OF FUELS, 1973-1974

(Percentage increase in the general price level)

		Increase in the final market value of a barrel of crude oil between early 1973 and (average) 1974		
		Direct	Indirect	Total
			From $8.55 to $21.11 (see table 16)	
Level of energy-intensiveness of production: (percentage)	1	0.01	0.01	0.02
	5	0.07	0.07	0.14
			From $8.55 to $16.28 (see table 16)	
	1	0.01	0.01	0.02
	5	0.05	0.05	0.10

Note: The two estimates presented above of the direct upward pressure on prices were taken from table 22.(under the 100% columns in the text and footnote, respectively). The total upward pressure on prices over a period of time (i.e., the sum of the immediate direct and the subsequent indirect pressures) was calculated in the following way: First, the average combined direct and indirect energy coefficient for intermediary industries was calculated separately for Argentina, using 1971 input-output data, and for Peru, using 1968 data. Second, each of these total energy coefficients was then divided by its respective average direct energy coefficient, yielding a ratio of 1.9 in the case of Argentina and 1.6 for Peru. Third, the 1.9 factor was applied to the direct upward price pressure factors presented above, yielding an estimate of the total upward pressure on prices over time. Fourth, the indirect upward pressure on prices triggered by the increased price of fuels was calculated as the difference between the total upward pressure on prices over a period of time and the direct upward pressure occurring more or less quickly, if increased fuel costs are passed on to final consumers. In view of the method used, the estimates of indirect effects presented here must be taken as highly approximate.

Because of the relatively high capital intensity of Argentina's production processes, the application of the 1.9 factor should be taken as an upper range estimate of the extent of the indirect upward pressure on prices.

In many of the region's oil-deficit countries, the indirect upward pressure on price will be substantially less on this account.

Finally, as noted in the text, the concept of the general price level being used here is not the same as the usual one. The usual statement of the general price level applies consumer expenditure weights to changes in product prices, while, implicitly, the concept of the general price level used here uses energy consumption weights. The difference in reported pressure between these two systems of weighting is probably minor in most cases, however.

The figures presented refer to the situation in which a country is wholly dependent on imported oil or prices domestically produced oil at its opportunity cost.

/A government

A government may, of course, decide to keep constant, or restrain the increase in, fuel prices to avoid what it views as the disruptive effects of inflation triggered by the increased price of oil. The main devices available for this include compensatory reduction in taxes on refined oil products; manipulation of oil import exchange rates; and the imposition of maximum refined oil products selling prices (or letting public sector price leadership achieve this same objective in a mixed energy sector) coupled with the extension of subsidies to oil refineries.

If taxes are reduced on refined oil products, then there will be, on this account alone, a decline in the level of central government revenues without a comparable reduction in manufactures, which is, at the margin, inflationary, unless financed by the sale of debt instruments to the private sector or by increased taxes. Additionally, this approach does not record in the market the increased economic scarcity of oil, leaving its consumption and importation unchecked, either in whole or in part. Finally, this option reduces the incentive for domestic consumers to substitute domestic energy sources for imported oil. If such substitution is desirable, subsidies would have to be extended to achieve it, adding further to the inflationary pressure associated with this policy option.

Governments may choose, on the other hand, to hold refined product prices constant (or to mitigate their increase), covering resulting energy industry deficits directly by subsidies. The effect is, clearly inflationary to the extent that such subsidies are paid and financed without increased taxes or the sale of debt instruments to the private sector. Additionally, it provides no brake on the consumption of refined oil products or, therefore, on oil imports.

If preferential import rates are extended by the State to oil importers, the immediate inflationary impact of the increased price of imported oil could be mitigated, or eliminated completely, by drawdowns of foreign exchange holdings by the central government for this purpose. For this reason, this option is open to countries with an initially strong foreign exchange position and/or with immediately

/bright export

bright export prospects. It would dampen, or leave unaffected, the rate of growth in the domestic demand for refined oil products, and drawdowns on foreign exchange for oil imports would be, in whole or in part, unattenuated. Strong export growth could compensate for drawdowns of foreign exchange for this purpose, but, lacking this, the increasing pressure on reserves could lead, ultimately, to increased inflationary pressure and devaluation.

With the exception of this last option, and, even here, with reservation, the original increased cost of imported oil will trigger an immediate upward pressure on the general price level. But, there are important differences, however, between an inflationary process caused by passing on increased oil costs to consumers and an inflationary process caused by compensatory reductions in taxes of energy flows or by the extension of subsidies to the oil industry to mitigate, or eliminate, an increase in the price of refined oil products.

In the first case, there is a check on the rate of growth in domestic oil consumption, although the quantitative force of this check will vary between countries; and, second, when increased fuel costs are passed on to consumers, the overall pattern of resource allocation, (i.e., not just of energy resources) in an economy is open to change in reflection of the higher price of oil and of fuels.

By comparison, these two adjustive mechanisms are absent, in whole or in part, with the adoption of compensatory tax reduction or direct subsidies in support of price cut-backs for fuels. Both fail to record the extent of the increased economic scarcity of oil and fuels in the economy. Consequently, consumer reactions to this reality is blocked, and drawdowns of foreign exchange will be more intensive than if market prices were allowed to reflect that increased scarcity in the first place. Finally, since the market does not record the increased scarcity of oil and fuels under these two policy options, the probable consequence will be that energy consumers, both final and intermediate, will continue to combine economically scarce resources in a way that is basically not responsive to economic reality.

/4. Production

4. Production and employment

What impact will the increased costs of fuels have directly on production and employment in the region's oil-deficit countries?

The increased cost of fuels constitutes an immediate increase in the variable financial costs of supply of every producing unit in the economy. Assuming these increased costs to be passed forward consumers will face an increase in the price of every good and service available to them for consumption. This constitutes an immediate reduction in their real income. This could trigger changes in consumer demand to which, in turn, producers would respond in terms of changes in the volume of their production and employment. Within this simple scheme, the pivotal variables are the extent of the initial increase in the price of specific goods and services due to the increased cost of fuels (or, the extent of reduction in real consumer income) and, then, the severity of consumer reaction to these price increases. These two variables will impact on production and employment decisions in each producing unit in the economy.

What can be said of the impact on the price of specific goods and services of the increased cost of fuels when these cost increases are passed forward to consumers?

A 7 per cent direct increase in the general price level (table 22), on this account alone, constitutes an immediate reduction in consumer real income by the same amount. With consumers spending, say, about 4 per cent of their total expenditures on fuels, and the price of fuels increasing by, say, 147 per cent (i.e., US$ 21.11/US$ 8.55, table 17), the reduction in real income stemming from the increased price of fuels would be about 2.4 per cent (i.e., 0.04-0.04/2.47). The rest of the direct reduction in consumer real income would be associated with the higher prices of goods other than fuels which consumers purchase from intermediary industries, 4.6 per cent (i.e., 7.0 per cent-2.4 per cent).

In the immediate future, it is likely that the consumption of fuels by households would be adversely affected by the price increases suggested in table 16, but there are forces operating to modify the severity of this effect. The cost to households of providing heat, light, motive power, and private transportation in the immediate future is given, more or less, by the variable fuel (and maintenance) costs involved, since the capital costs have already been incurred. Some efficiencies will surely be triggered by domestic final consumers in their use of kerosene, natural gas, electricity and other fuels, but these may be minor in terms of their impact on total, direct domestic demand for fuels in many countries. In rural areas where average income per family is often close to subsistence levels, the cutback in household energy consumption could be quite severe, and it could trigger a reversion to the use of fuel wood and other traditional energy sources.

The impact on the demand of domestic final consumers for the product of intermediary industries other than the energy industries will be quantitatively more important, since about seven-tenths of the 7 per cent, direct reduction in real consumer income is concentrated in this component of demand (i.e., 4.6 per cent/7.0 per cent = 66 per cent). The average decrease in consumer real income on this account, 4.6 per cent, implies that some products will increase in price less rapidly than this average rate while others will increase more rapidly. Table 24 presents an estimate of the upward pressure on the price of various classes of products due to increased energy costs. With increased energy costs being passed forward to consumers, the pattern of differences in product price increases due to those increased costs, is not difficult to identify. Because of their relatively low energy intensive production techniques, primary industries (i.e., agriculture, forestry, fishing, and hunting) will experience below-average price increases due directly to rising energy costs. The major qualification here is, of course, the increased pressure on agricultural prices due to sharply rising

/Table 24

Table 24

ESTIMATED RANGE OF DIRECT UPWARD PRESSURE ON PRICES OF VARIOUS CLASSES OF PRODUCTS DUE TO VARIOUS DEGREES OF INCREASE IN ENERGY COSTS, 1973-1974

(Units as indicated)

	Estimated direct energy coefficients		Estimated range of direct energy coefficients: 1973		Percentage increase in the cost of production of given product classes due to the direct increase in the cost of energy associated with an increase in the final market value of a barrel of oil in 1973 from:			
					$6.42/bbl. to 1974 level of:		$8.55/bbl. to 1974 level of:	
	Peru, 1968	Argentina, 1970	Low	High	$12.76/bbl.	$16.73/bbl.	$16.28/bbl.	$21.11/bbl.
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)
Agriculture: Food	0.005	...	0.003		0.01 -	0.01 -	0.01 -	0.01 -
Industrial	0.019	...	0.012		0.02 -	0.03 -	0.02 -	0.03 -
Livestock	(r)	...						
Forestry, hunting, fishing	(r)	...						
Primary sector, Total	0.019	0.005		0.006	- 0.01	- 0.02	- 0.01	- 0.01
Textiles	0.010	0.012	0.006	0.015	0.01 - 0.03	0.02 - 0.04	0.01 - 0.03	0.01 - 0.04
Footwear	0.004 }	0.004	0.003 }	0.005	0.01 } 0.01	0.01 } 0.01	0.01 } 0.01	0.01 } 0.01
Apparel	0.003 }		0.002 }		... }	0.01 }	... }	... }
Furniture	0.010	0.012	0.006	0.015	0.01 - 0.03	0.02 - 0.04	0.01 - 0.03	0.01 - 0.04
Paper	0.026 }	0.019	0.017 }	0.024	0.03 } 0.05	0.04 } 0.06	0.03 } 0.05	0.04 } 0.06
Printing	0.006 }		0.004 }		0.01 }	0.01 }	0.01 }	0.01 }
Rubber	0.020	0.017	0.013	0.022	0.03 - 0.04	0.03 - 0.06	0.03 - 0.04	0.03 - 0.05
Chemicals	0.036	0.026	0.023	0.033	0.05 - 0.07	0.06 - 0.08	0.05 - 0.06	0.06 - 0.08
Construction	(r)	0.023		0.029	- 0.06	- 0.07	- 0.06	- 0.07
Equipment	...	0.011		0.014	- 0.03	- 0.04	- 0.03	- 0.03
Non-electrical	0.011	...	0.007		0.01 -	0.02 -	0.01 -	0.02 -
Electrical	0.001	0.009	0.001	0.011	... - 0.02	... - 0.03	... - 0.02	... - 0.03
Transportation	0.028	...	0.018		0.04 -	0.05 -	0.04 -	0.04 -
Non-metallic minerals	0.117	0.080	0.075	0.101	0.15 - 0.20	0.19 - 0.26	0.15 - 0.20	0.19 - 0.25
Wood and cork	0.024	...	0.015		0.03 -	0.04 -	0.03 -	0.04 -
Mining: minerals and metals	0.035	0.022	0.022	0.028	0.04 - 0.06	0.06 - 0.07	0.04 - 0.05	0.06 - 0.07
Metal fabrication	0.016 }	0.035	0.010 }	0.045	0.02 } 0.09	0.03 } 0.11	0.02 } 0.09	0.02 } 0.11
Basic metals	0.042 }		0.027 }		0.05 }	0.07 }	0.05 }	0.07 }
Services	0.028	...	0.018		0.04 -	0.05	0.04	0.04 -
Transportation	0.104	0.106 1/	0.066	0.135	0.13 - 0.27	0.17 - 0.34	0.13 - 0.26	0.16 - 0.33
Food products and beverages	0.010 }	0.016	0.006 }	0.020	0.01 } 0.04	0.02 } 0.05	0.01 } 0.04	0.01 } 0.05
Tobacco	0.001 }		0.001 }		... }	... }	... }	... }

Notes by column:

(a) Direct energy coefficients taken as the sum of sectors 9 (Energía) and 25 (Fabricación del petróleo y carbón) as presented in: Instituto Nacional de Planificación, Modelos Interindustriales de la Economía Peruana, Tabla Insumo-Producto 1968, (Lima, 1972), Table 3 - 3.

(b) Direct energy coefficients taken as the sum of sectors 11 (Combustibles y Derivados del Petróleo) and 18 (Electricidad, Gas y Agua) as presented in: Secretaría de Planeamiento y Acción del Gobierno, Subsecretaría de Desarrollo, Modelo Econométrico Sectorial Dinámico, Actualización de la Matriz de Insumo-Producto a 1970, Cuadro 49.

(c) Each of the coefficients in column (a) was increased by a 5.0% compound annual growth factor, as a maximum allowance for increasing energy-intensiveness of production during 1968-1973. A 50% reduction was then made for each adjusted coefficient in 1973 to establish a "low" energy coefficient (i.e., below which few, if any, industries in the country would fall).

(d) Each of the coefficients in column (b) was increased by a 5.0% compound annual growth factor, as a maximum allowance for increasing energy-intensiveness of production during 1970-1973. A 10% increase was then made for each adjusted coefficient in 1973 to establish a "high" energy coefficient (i.e., above which few, if any, industries in the country would rise).

(e) Coefficients in columns (c) and (d) multiplied by 1.99 (i.e., $12.76 per barrel ÷ $6.42 per barrel).

(f) Coefficients in columns (c) and (d) multiplied by 2.61 (i.e., $16.73 per barrel ÷ $6.42 per barrel).

(g) Coefficients in columns (c) and (d) multiplied by 1.90 (i.e., $16.28 per barrel ÷ $8.55 per barrel).

(h) Coefficients in columns (c) and (d) multiplied by 2.47 (i.e., $21.11 per barrel ÷ $8.55 per barrel).

(e) - (f) The $/barrel figures on which the percentage increases in energy prices used here were based were taken from Table 13.

Figures may not tally, due to rounding.

Legend: (r): less than 0.005 as reported in original source data. (n.a.): not available. ...: when rounded, less than 0.01. Blank: not calculable due to prior (r) or (n.a.) entry.

1/ Includes transport, warehousing and communications.

/fertilizer costs.

fertilizer costs.36/ 37/ Price increases, directly triggered by rising energy costs, will probably be less than average in some of the tertiary industries as well (e.g., banking, insurance, and wholesale and retail trade). On the other hand, price increases will be higher than average in the whole range of intermediate products, especially those which have high metal content (e.g., producers' and consumers' durables); or a directly high energy content (e.g., transportation, paper, mining, and chemicals); or a high degree of reliance on fuels as a raw material input (e.g., petrochemicals, fertilizers, 38/ synthetic rubber). The data in table 24 show the pattern of direct upward pressure on prices for a broad group of product classes.

The reaction of consumers to the higher price of these products, caused by the direct effect of producers passing on to them higher fuel costs, could provide an immediate downward pressure on aggregate demand. If prices rise more or less simultaneously, the potentially negative impact on production and employment will probably be less than if these prices rose in a jerky fashion. With prices rising smoothly, price differentials would be less drastric than if prices rose jerkily, and, therefore, the resort to domestically produced substitutes would probably be less, as would the rupture over time in tho pattern of intermediate output and employment.

36/ Due to a combination of insufficient growth in capacity and increased oil prices, the cost of urea fertilizer has increased from US$ 62 per ton in 1968 to about US$ 225 per ton in December, 1973. Source: Memorandum to Executive Directors, dated March 5, 1974, by Robert S. McNamara, President, International Bank for Reconstruction and Development, p. 2.

37/ This subject is developed in more detail in the Symposium paper entitled: The Energy Crisis and Agriculture - A Background Assessment.

38/ Refer to the Symposium paper entitled: Fertilizantes: Perspectivas de abastecimiento y precios.

/Where prices

Where prices rise more or less simultaneously, the major threat will probably be an increased pressure for the substitution of imports for domestic production, a threat which is also present in the situation where prices rise jerkily.39/

When the indirect upward pressure on price (or downward pressure on real consumer income) is introduced (table 23), the immediate upward pressure on prices is aggravated substantially. If, for example, it took 1-2 years for these indirect upward price pressures to work themselves out,on the average, in the form of higher product prices, then the increase in the price of intermediate goods on this account would be about 4.7 per cent (i.e., 7 per cent/ 1.5 years). Hence, the immediate maximum upward pressure on prices due directly to higher fuel costs would be about 12 per cent in the first year (i.e., 7 per cent direct plus 4.7 indirect) followed by a reduction to 4.7 per cent in the following year.

39/ The shift from relatively more to less energy intensive products of domestic industry (e.g., from synthetic to natural fibres) in response to an initial change in relative product prices would quickly drive up the price of the substitute goods, throttling the initial impetus to substitute them in the first place. In the meanwhile, a rupture in the pattern, and levels, of output and employment could be induced that might provide little, if any, net benefits in an economic sense. In general, the potential scope of this kind of substitution seems quite limited in the region's oil-deficit countries. In this same vein, a more serious threat, however, is the substitution of imported, relatively high energy-intensive goods (such as machinery and equipment) for the same goods produced by domestic intermediary industries but with far lower levels of efficiency in the use of energy inputs; and, in addition, the threat of the substitution of imported, natural and low energy-intensive products for domestically produced and relatively high energy-intensive products (such as imported natural for synthetic rubber, imported lumber for domestically produced plastic products, and so on). Unless moderated by trade policies, this source of pressure could aggravate the pervasive and severe pressure on balance of payments account in many of the region's oil-deficit countries.

The supporting papers provide detailed analyses of the impact of increased fuel costs on specific industries; agriculture, fertilizers, transportation and electric power.

/It is

It is impossible to translate these conclusions into quantitative changes in the volume of production and employment. The data simply do not exist to do so in a convincing empirical way, either on an individual oil-deficit country basis or on a regional level. But, two sets of implications seem clear, nevertheless: first, domestic fiscal and monetary policy in the region's oil-deficit countries must be prepared to deal immediately, although in different degrees of severity depending on the country, with the prospect of reduced levels of output and employment triggered by the increased cost of fuels; and, second, on the one hand, foreign trade policy must be prepared to deal with a possible increase in the demand for imports in substitution of higher price domestically produced outputs (and intermediary inputs as well) induced by the increased cost of fuels; and, on the other hand, continuing high priority will have to be given to the area of export promotion as part of an effort to reduce the possibly severe impact on domestic output and employment in some of the region's oil-deficit countries.

5. The balance of payments

Table 25 presents information that is useful in gauging the immediate severity of the increased cost of imported oil on the international financial position of the region's oil-deficit countries. It provides a comparison of the increase in the level of payments by specific oil-deficit countries in the region for imported oil during 1974 with their individual international reserve position in January, 1974, net of the estimated level of the international debt service in that year. It also presents for these countries the share of (net) oil imports in their total imports (CIF) in 1973, and the ratio of (net) foreign reserves at the beginning of 1974 to the level of imports (CIF) in 1973.

/Table 25

Table 25

SELECTED DATA ON FOREIGN EXCHANGE RESERVES, TOTAL IMPORTS AND OIL IMPORTS OF SELECTED LATIN AMERICAN COUNTRIES, 1973-1974

(Units as indicated)

Country	Total int'l reserves, Jan, 1974	Int'l debt service in 1974	Net int'l reserves (NIR)	Total imports, CIF 1973	Oil imports (net) 1973	Ratio of NIR to total imports, 1973 (%)	Change in value of oil imports 1973-1974 (US$ mln)	Ratio of oil imports (net) to total imports 1973 (%)	Ratio of change in value of oil imports (net) (1973-1974) to NIR (%)
	Millions of $ US								
	A	B	C	D	E	F	G	H	I
Argentina	1 316(a)	512	804	2 100	170	38	205	8	25
Brazil	6 109(b)	329	5 780	6 650	780	87	1 325	12	23
Chile	134(m)	312		1 500	120		280	8	
Mexico	1 290(a)	517	773	3 960	229	20	250	6	29
Peru	646(n)	174	472	1 100	80	43	110	7	23
Uruguay	228(a)	30	198	250	47	126	98	23	49
Paraguay	56(c)	13	43	125	9	34	15	7	35
Guyana	16(h)			175	19		56	11	
Guatemala	234(g)	16	218	400	28	55	68	7	31
Costa Rica	41(d)	15	26	410	26	6	34	6	169
El Salvador	63(f)	11	52	360	20	14	31	6	60
Honduras	42(j)	11	31	235	17	13	54	7	174
Jamaica	117(a)	24	93	640	86	15	71	13	76
Nicaragua	128(k)	21	107	240	21	45	22	8	21
Panama	1 212(l)	11	1 201	525	73	229	75	14	6
Dominican Republic	59(e)			440	56		94	13	
Barbados				162	12		15	7	
Haiti	18(i)			85	5		7	6	

Soources by column:

A: (a) International Financing Statistics, (IFS), June, 1974, p. 19.
   (b) Ibid, p. 19; the figure is for February, 1974.
   (c) Refers to Central Bank reserves in January, 1974. Ibid, p. 291.
   (d) Refers to Central Bank reserves in January, 1974. Ibid, p. 105.
   (e) Refers to Central Bank reserves in January, 1974. Ibid, p. 117.
   (f) Refers to Central Bank reserves in January, 1974. Ibid, p. 129.
   (g) Refers to Bank of Guatemala reserves in January, 1974. Ibid, p. 159.
   (h) Refers to Bank of Guyana reserves in January, 1974. Ibid, p. 163.
   (i) Refers to National Bank reserves in January, 1974. Ibid, p. 167.
   (j) Refers to Central Bank reserves in January, 1974. Ibid, p. 171.
   (k) Refers to Central Bank reserves in January, 1974. Ibid, p. 271.
   (l) Refers to reserves of deposit money banks, second quarter, 1973. Ibid, p. 287. Of this total, foreign exchange was $ 1 200 mn.
   (m) Estimate given in IBRD report dated 5 May 1974, entitled "Interim Report on the Additional External Capital Requirements of Developing Countries to Deal with the Effects of the Increased Prices of Oil and Other Commodities", Table VIII. The figure is for end-of-year, 1973.
   (n) IFS, June, 1974, p. 19. Figure is for November, 1973.

B: ECLA, on the basis of different sources.

C: (A - B).

D: Preliminary estimates made by ECLA Statistical Division on the basis of IMF data.

E: IDB, Economic and Social Development Department, Country Studies Division, Impacto de la Crisis del Petróleo en América Latina en 1974, dated 24 February 1974, Table I. Data for Guyana taken from source noted below in (G).

F: (C - E).

G: ECLA, on the basis of different sources.

H: (E - D).

I: (G - C).

/The estimates

The estimates are rough in several senses. First, they do not include the indirect, upward pressure on the value of imports associated with the increased cost over time of inputs other than fuels required in the production of imported goods. This is a particularly serious ommission when account is taken of the sharply increased cost, over 1973 levels, of many imports, such as artificial fertilizers, producers' and consumers' durables, for example. Second, the estimates do not consider off-setting gains in the form of increased foreign exchange earnings from re-exports or the export of indigenously produced energy sources in the form of product exports. Third, the estimates do not account for changes in the balance of payments of a country that may arise because of reasons analytically distinct from the higher price of internationally traded oil. For example, strong gains in export earnings from coffee would cushion the balance of payments pressure on oil account in Brazil, Colombia, El Salvador, Guatemala and Haiti, for example, as would a buoyant export market for copper in the cases of Chile and Peru, for beef in the case of Argentina and Uruguay, and for timber in Paraguay. Likewise, ready access to international credits and favourable developments in the terms of trade in specific countries would obviously relieve the degree of financial pressure on oil account. Finally, as will be discussed subsequently, the estimates presented in table 25 implicitly assume that there will be no drastic reduction in the level of world production and trade owing to higher energy prices or other causes.

The figures in table 25 suggest that Argentina, Brazil, Guatemala, Mexico, Nicaragua, Panama, Paraguay, and Peru will be in a relatively strong position to withstand the initial direct financial impact of the increase in the cost of oil imports during 1973-1974, although this ability varies widely between these countries. In all of them, however, the pressure on foreign reserves will become increasingly severe beyond 1974. In each of these countries, the increment in the oil import bill during 1973-1974 is less than about one-third of

/foreign reserves,

foreign reserves, net of international debt service. Additionally, the share (1973) of oil in total imports will be increasing from relatively low bases.

Panama is in a particularly favourable position, given its strong external financial position and the relatively small scale of its inland oil consumption. This is also the case with Brazil, given this country's strong international credit position. It is especially the case if strong growth in coffee export earnings is projected into the near future.

Peru's payments position on oil account would also be favourably cushioned by strong export prices for copper, fish, and other primary products, and it should be improved further, in 1976, when with the completion of the crude oil pipeline to the Pacific, it will be possible for Peru to become an oil exporter.

In the case of Argentina, its relative self-sufficiency in oil, a comparatively strong reserve position, continued access to foreign credits, and the prospects for continued favourable earnings from exports of wheat and beef, place this country in a relatively strong position to withstand the transition to a higher level of international oil prices.

The relatively strong international reserve position and low share of oil in total imports in the case of Guatemala, Nicaragua and Paraguay should also cushion the immediately negative impact of their increased oil imports during 1973-1974. This is also the case with Mexico, but to a lesser degree. However, a decline in tourist receipts, threatened by increased energy costs internationally, would increase substantially the strain on Mexico's transition to higher world oil prices. On the other hand, Mexico's relative access to international credits provides an additional source of potential relief. But, here again, as is the case, in general with Latin America's oil-deficit countries, the ease of transition will hinge largely on the performance of world commodity prices, which, in Mexico's case, covers a wide array, including cotton, sugar, coffee, shrimp and a variety of metals, for example.

/Many of

Many of the Caribbean and Central American Republics together with Chile and Uruguay face far harsher financial pressure in 1974 from the expected increase in their oil import bill. The expected increment in the value of oil imports during 1973-1974 in four of these countries is close to, or greater than, the level of the international reserves, net of international debt service in 1974. These countries are Costa Rica, the Dominican Republic, Honduras and Guyana. In two other countries in this group (i.e., El Salvador and Jamaica), the incremental oil import bill expected in 1973-1974 is greater than three-fifths of net foreign exchange reserves. Only partial data are available for Haiti and Barbados, but they suggest severe financial pressure as well.

The actual level of Chile's international reserves at end-1973 was not available, but the IMF estimate shown in table 25, suggests a severely adverse financial impact on this country stemming directly from the higher price of imported oil: even if international debt service in 1974 were reduced to zero, the value of oil imports by Chile expected in 1974 would be 2.5 times the level of those reserves. However, if copper prices remained strong and the rate of inflow of foreign credits accelerated, this would alleviate the balance of payments pressure arising from increased oil prices in the case of Chile. In any case, the pressure will be extremely intense.

In the case of Uruguay, the increase in the oil import bill expected during 1973-1974 represents about one-half of foreign reserves, net of debt repayments in 1974. If world prices for meat, wheat, and hides continue strong in 1974, Uruguay's pressure on oil import account will be eased, but it will be severe, nevertheless. In 1973, Uruguay had the highest ratio of oil to total imports (i.e., 23 per cent) of the countries covered in table 25, and the sharp rise in this share expected in 1974 implies a reduction in the imports of many essential goods. While this effect will be a general one in the region's oil-deficit countries, the degree of restriction will be particularly severe in Uruguay.

/The previous

The previous remarks relate to the increased pressure on international reserves in Latin America's oil-deficit countries occurring solely due to the expected increase during 1973-1974 in the oil import bill. If these first-year impacts are projected into the future, the conclusion is apparent that all of these countries could face severe payments pressure in the near future, threatening in turn, the viability of their economies and the wellbeing of their populations.

The increased price of oil and energy is a world-wide phenomenon, which means that the price of a wide variety of goods and services moving in international trade will rise in response to higher energy costs. For Latin America's oil-deficit countries, this will provide an additional, and important negative balance of payments pressure. Basically, as the data in table 26 indicate, these countries exchange land and labour intensive goods in the international market for capital and energy intensive goods.

Table 26

LATIN AMERICA: EXPORTS (FOB) AND IMPORTS (CIF), BY COMPOSITION, 1970

(In units as indicated)

Exports ($mn)	15 500	Imports	13 609
Primary products (%)	87	Consumer durables (%)	5
Manufactures (%)	13	Producers durables (%)	36
		Fuels (%)	6
		Other (%)	53

Source: CEPAL, América Latina: Exportaciones de Productos Primarios y Manufacturados según Destino, tables 3 and 4; and CEPAL, working paper entitled; Importaciones Clasificadas según la CUODE.

/When account

When account is taken of the increased cost, not only of imported fuels, but of imported durables as well, the conclusion is further reinforced that virtually all of the region's oil-deficit countries will be strongly and negatively impacted by the increased cost of imported oil supplies.40/

These estimates of external financial pressure implicitly assume that changes in the value of exports from the region's oil-deficit countries do not aggravate the financial pressure occasioned by the increased cost of fuels. It is still too early to judge the accuracy of this assumption, but the sharp reduction (5.8 per cent) in the annual rate of growth in real GNP recorded in the United States during the first quarter of 1974 suggests that it may be optimistic.41/

It was suggested earlier that the direct impact of the increased price of oil and fuels on the general price level, while varying between Latin America's oil-deficit countries, did not present an alarming prospect as a whole. Additionally, while it was impossible to quantify the conclusion, the direct impact of increased energy costs on production and employment on the region's oil-deficit countries poses an immediate threat, but not one of dire proportions.

In contrast, however, the impact of increased oil prices on the international financial position of Latin America's oil-deficit countries is so severe that it does threaten, in turn, the viability of production and employment in many of them, and far more than the threat stemming directly from the increased price of oil.

40/ The drain in foreign exchange due to the increased cost of capital imports into the region's oil-deficit countries is examined in detail in the Symposium paper entitled: Incremento de las necesidades de inversión originados en el aumento del precio del petróleo.

41/ "US Reports GNP Declines by 5.8 per cent", International Herald Tribune, April 9, 1974, p.7. The figures on which the 5.8 per cent decline is based are preliminary. Durable goods expenditures declined by US$ 1.1 billion largely due to the drop in the level of automobile sales, a fact which is, undoubtedly, heavily related to the increased price of motor gasoline in the US market.

/In five

In five country cases, for example, the oil import bill in 1974 will probably be greater than those countries' holdings of gold, foreign exchange, SDR's, and their reserve position in the International Monetary Fund. Either they acquire additional international credits immediately, or they must curtail the volume of their oil (and other) imports, assuming no inordinate increase in export earnings. And, if this eventuality emerges in these countries, then production and employment could decline sharply, one source of moderation on this account being the way in which the reduced level of imported petroleum is allocated in the economy. While the prospects are not as bleak as this in the region's other oil-deficit countries, this threat to output and employment is certainly there in many of them, especially when the increased cost of other imports due to the higher oil prices is considered in addition to their increased oil import bill. Should aggregate demand in the developed countries stagnate, then the threat to output, employment, and the value of their currencies is present in all of them.

6. International perspective and problems

The problem of higher oil prices cannot be discussed either exclusively within the framework of Latin America's oil-deficit countries or without reference to other factors impinging on the prospects for economic growth in the international economy. The direct threat to output and employment in Latin America's oil-deficit countries stemming from the sharp increase in energy costs has its counterpart in every world region as it does for both the developed and developing countries. When the problem of sharply increased energy prices is put into a broader, international perspective, it is apparent that the threat to world output and employment is a grave one, and, particularly for the developing countries of Latin America and elsewhere.

Even prior to the increase in world oil prices recorded in late 1973, the World Bank had revised downward its estimate of the rate of growth in real GNP in the OECD countries for 1974. In comparison with the 6.6 per cent growth recorded in 1973, the forecast rate of growth for 1974 was revised downward to 3.8 per cent. Nevertheless, it was still believed in December 1973, that, due largely to favourable terms of trade and strong growth in export earnings, the developing countries could achieve an average growth rate of about 6 per cent during 1973-1980, meeting the target rate of the United Nations Second Development Decade.

These expectations were shattered with the increase in world oil prices in January 1974. The World Bank's estimate of OPEC Government revenues (total and per barrel) are presented in table 27 and 28: they show these revenues rising from US$ 23 billion to US$ 85 billion during 1973-1974, and then, to US$ 100 billion and US$ 171 billion in 1975 and 1980, respectively.

Estimates of the surplus on current account of the OPEC Governments in 1974 vary widely, with one observer placing the range between US$ 50-US$ 66 billion.42/ If this sum is not cycled back into international financial channels, it would constitute a massive and immediate depressant on world output and employment. The World Bank estimates that, in 1974, the deficit on current account in the OECD countries will be about US$ 44 billion, and the resource gap of the developing countries requiring international financing will be on the order of US$ 2.6 billion (US$ 6.8 billion in 1975).

In March 1974, the World Bank revised its forecast of growth rates for the OECD countries and for a sample of 40 developing countries for the period 1974-1980. This revised forecast assumes, *inter alia*, that the immense payments problem of the OECD countries will be handled in such a way that serious economic disruption stemming from the management of this problem will be avoided.

42/ J.P. Grant, *Energy Shock and the Development Prospect*, (draft version), February 1974 (pages unnumbered). Grant also estimates a need for recycling about US$ 10-US$ 20 billion annually in investment and aid by the industrial and OPEC countries to the non-oil-exporting developing economies over the next several years.

/Table 27

Table 27

ESTIMATED OPEC a/ GOVERNMENT REVENUES, SELECTED YEARS, 1960-1980

(US$ millions)

(Revised to reflect new prices announced on 23 December 1973 and effective 1 January 1974)

Country	1960	1965	1970	1971	1972	1973	1974	1975 Low	1975 Medium	1975 High	1980 Low	1980 Medium	1980 High
Saudi Arabia	355	655	1 200	2 101	2 988	4 915	19 400	22 150	22 850	23 500	36 300	43 450	50 550
Kuwait	465	671	895	1 439	1 600	2 130	7 945	8 450	8 700	9 000	10 250	12 250	14 300
Abu Dhabi b/	-	33	233	418	538	1 035	4 800	6 400	6 550	6 750	12 400	14 750	17 150
Qatar	54	69	122	185	247	360	1 425	1 600	1 650	1 700	2 400	2 900	3 350
Iraq	266	375	521	840	802	1 465	5 900	7 300	7 550	7 750	13 650	16 750	19 800
Iran	285	522	1 093	1 934	2 423	3 885	14 930	16 600	17 100	17 600	25 650	30 700	35 750
Algeria b/	-	-	381	440	680	1 095	3 700	4 100	4 250	4 350	4 750	5 750	6 700
Libya b/	-	371	1 295	1 846	1 705	2 210	7 990	9 750	10 050	10 400	10 550	12 850	15 100
Nigeria b/	-	-	411	883	1 200	1 950	6 960	8 250	8 500	8 700	11 350	14 250	17 100
Indonesia	...	...	185	284	480	830	2 150	2 100	2 200	2 300	2 400	2 950	3 500
Venezuela	877	1 135	1 406	1 751	1 933	2 800	10 010	10 200	10 550	10 850	12 100	14 500	16 900
Totals	2 303	3 831	7 742	12 120	14 515	22 675	85 210	96 900	99 950	102 900	141 800	171 100	200 200
Compound Annual Growth:	1960-1965: 10.7		1965-1970: 15.2		1972-1973: 56.2		1973-1974: 275.8		1970-1975: 65.0		1975-1980: 7.9	1975-1980: 11.3	1975-1980: 14.2
											1973-1980: 30.0	1973-1980: 34.0	1973-1980: 36.0

Source: 1960-1970, Petroleum Information Foundation.
1971-1980, Petroleum Economics Limited and Bank estimates.
Both tables 27 and 28 were taken from IBRD, Memorandum Sec. M.74-24 from the Secretary, R.S. McNamara, entitled Implications of Increased Petroleum Prices since the Beginning of 1974, Tables 2a and 2b. (reproduced in entirety).

a/ In November 1973 Ecuador became a member of OPEC and Gabon an Associate Member; they are not included in the present analysis.

b/ Libya and Abu Dhabi started production in 1961 and 1962 respectively. Algeria and Nigeria started production in 1958, but no comparable figures are available for their earlier years at the present time.

The data presented in this Table were published in early 1974. Since then, the projections presented in it may have been revised, and the Table is presented here with this reservation in mind.

Table 28

ESTIMATED OPEC a/ GOVERMENT REVENUE PER BARREL, SELECTED YEARS, 1960-1980

(US$ per barrel)

(Revised to reflect new prices announced on 23 December 1973 and effective 1 January 1974)

Country	1960	1965	1970	1971	1972	1973	1974	1975			1980		
								Low	Medium	High	Low	Medium	High
Saudi Arabia	0.75	0.33	0.88	1.23	1.40	1.91	6.99	7.38	7.61	7.83	8.75	10.47	12.18
Kuwait	0.77	0.79	0.83	1.23	1.40	1.89	6.97	7.35	7.58	7.80	8.71	10.43	12.25
Abu Dhabi b/	-	0.33	0.92	1.24	1.40	2.03	7.50	7.92	8.16	8.40	9.38	11.19	13.00
Qatar	0.86	0.82	0.92	1.18	1.40	1.99	7.28	7.67	7.91	8.14	9.06	10.85	12.64
Iraq	0.79	0.82	0.96	1.42	1.60	2.21	7.61	8.03	8.28	8.53	9.38	11.50	13.61
Iran	0.80	0.81	0.82	1.24	1.41	1.90	7.06	7.45	7.68	7.90	8.83	10.57	12.30
Algeria b/	-	-	1.07	1.62	1.83	2.74	9.26	9.77	10.07	10.36	10.88	13.16	15.43
Libya b/	-	0.84	1.09	1.87	2.13	3.07	9.51	10.00	10.33	10.65	10.90	13.24	15.58
Nigeria b/	-	-	1.04	1.58	1.84	2.72	8.70	9.20	9.48	9.75	10.60	13.30	16.00
Indonesia c/	...	...	0.69	1.03	1.42	1.97	5.06	4.79	5.02	5.25	4.25	5.27	6.29
Venezuela	0.89	0.96	1.09	1.46	1.60	2.30	8.17	8.62	8.89	9.15	10.20	12.23	14.25

Sources: 1960-1970, Petroleum Information Foundation.
1971-1980, Petroleum Economics Limited and Bank estimates.

a/ In November 1973 Ecuador became a member of OPEC and Gabon an Associate Member; they are not included in the present analysis.

b/ Libya and Abu Dhabi started production in 1961 and 1962 respectively. Algeria and Nigeria started production in 1958, but no comparable figures are available for their earlier years at the present time.

c/ Data for Indonesia are from the latest economic report on Indonesia and cover both the State oil enterprise Pertamina and foreign contractors. Pertamina pays little tax, and its share of total output is expected to rise in thefuture. Hence the Goverment revenue per barrel from total exports rises little, although revenue from foreign contractors' exports is expected to rise from about $ 1.57 in 1972 to levels in 1980 roughly comparable with those for exports from the Persian/Gulf.

The data presented in this Table were published in early 1974. Since then, the projections presented in it may have been revised, and the Table is presented here with this reservation in mind.

/The Bank's

The Bank's two alternative growth trajectories for the OECD countries during 1974-1980 are shown in table 29. The implications of these alternative growth patterns were then drawn for the developing countries. It was concluded that, owing largely to a reduction in the volume of exports, a weakening in commodity prices (table 30),43/ and a worsening in the terms of trade (table 31), the import capacity of the developing countries during 1974-1980 would deteriorate sharply (table 32).

Assuming that there would be no change in the flow of capital to the developing economies, the following projections were then made for the growth in total real output in the developing economies during 1973-1980 (table 33).

These figures show that, even if international monetary management in the OECD countries were successful in avoiding economic disruption, the deceleration in the average rate of growth in total real output of the developing countries below levels forecasted only several months ago would be severe. Under the more optimistic of the two OECD growth trajectories, the average rate of growth in total real output in the developing countries would be 4.9 per cent during 1973-1980, 18 per cent below the rate anticipated in December 1973. Under the other growth trajectory, the comparable growth rate would be 1.9 per cent, 68 per cent below the 6.0 per cent estimate made by the Bank in December 1973.

These projections imply that, at best, some Latin American and other developing countries might achieve the 6 per cent output growth target of the Second Development Decade, but that many would not; and that, at worst, many of the developing countries in Latin America and elsewhere would face the prospect of negligible growth, or an actual decline, in the level of real output per capita during 1973-1980.

43/ Refer to the Symposium paper which examines recent crude oil prices in the context of recent basic commodity prices.

Table 29

ALTERNATIVE ASSUMPTIONS OF ANNUAL RATES OF GROWTH
IN GNP OF DEVELOPED REGIONS, 1974 TO 1980

(Per cent per annum)

	1972 (actual)	1973 (est.)	High variant			Low variant		
			1974	1975	1976-1980	1974	1975	1976-1980
Japan a/ and Oceania	8.5	10.3	4.0	6.0	7.0	3.0	5.0	7.5
Western Europe	4.3	6.0	2.0	2.5	5.5	0.5	1.5	3.0
United States, Canada	6.1	6.1	2.3	3.5	6.0	1.5	2.5	3.5
Average, all OECD countries	5.7	6.6	2.4	3.5	6.0	1.3	2.5	3.9

Source: IBRD, Memorandum dated 5 March 1974 entitled: Interim Report on the Additional External Capital Requirements of Developing Countries to Deal with the Effects of the Increased Price of Oil and Other Commodities, Table 1, p. 3 (reproduced in entirety.

a/ The alternative growth patterns for Japan, which show a higher long-term rate of growth in the Low Variant, reflect alternative adjustment patterns to lower energy use in industry. A rapid adjustment might reduce growth in the early years but permit higher rates un later years, whereas a lesser degree of success might maintain a higher rate of growth in the early years but lessen the growth potential in the long run.

The data presented in this Table were published in early 1974. Since then, the projections presented in it may have been revised, and the Table is presented here with this reservation in mind.

/Table 30

Table 30

INDEXES OF ACTUAL AND FORECAST COMMODITY PRICES, SELECTED YEARS, 1972-1980

(Current US$ prices)

1967-1969 = 100

Commodity	Actual prices			Forecast prices		
	1972	1973	January 1974	1974	1975	1980
Petroleum	146	208	665	665	665	923
Food						
Cocoa Beans	89	181	181	181	181	181
Coffee	125	155	174	175	163	175
Tea	98	100	117	116	121	128
Sugar (World)	317	413	647	783	522	522
Sugar (US preferential)	123	137	169	215	185	209
Bananas	107	114	a/	120	125	150
Livestock products						
Beef	159	207	216	231	231	271
Hides and Skins	163	205	a/	216	237	289
Grains						
Wheat	106	219	319	284	299	239
Rice	74	177	271	177	164	152
Maize	110	192	240	235	216	196
Grain Sorghum	114	190	236	224	214	194
Fats and oils						
Coconut oil	64	89	a/	123	123	117
Copra	66	166	352	144	140	133
Groundnut oil	144	185	325	240	233	205
Groundnuts	142	207	278	214	213	286
Palm oil	114	201	303	206	205	200
Fishmeal	165	374	418	414	414	431
Soyabean Meal	133	443	a/	284	268	289
Non-food						
Cotton	127	177	300	267	250	217
Jute	111	105	a/	121	126	140
Sisal	142	303	a/	246	200	196
Wool	141	304	317	250	261	275
Rubber	82	164	252	191	159	205
Tobacco	101	103	a/	106	113	146
Timber						
Logs	103	168	242	175	193	300
Metals and minerals						
Copper	83	140	159	155	138	172
Lead	119	169	223	157	144	204
Tin	115	147	199	168	168	235
Zinc	138	311	486	395	242	302
Bauxite	130	140	a/	200	220	300
Iron Ore	108	157	a/	137	130	199
Manganese Ore	100	113	170	100	93	155
Export price index (in US$) of equipment by origin: b/						
France	120	155	-	-	-	231
Federal Republic of Germany	146	186	-	-	-	277
Italy	130	153	-	-	-	228
Japan	140	182	-	-	-	271
United Kingdom	142	156	-	-	-	232
United States	117	133	-	-	-	198

Source: International Bank for Reconstruction and Development, Additional External Capital Requirements of Developing Countries, March 5, 1974, Table III (reproduced in entirety).

a/ Not available.

b/ Estimated for 1973 and 1980, assumes no change in relative exchange rates after 1973.

The data presented in this Table were published in early 1974. Since then, the projections presented in it may have been revised, and the Table is presented here with this reservation in mind.

/Table 31

Table 31

TERMS OF TRADE FOR 40 DEVELOPING COUNTRIES, 1972-1980

(1967-1969 = 100)

	December 1973 Projections			March 1974 Projections					
				High Variant			Low Variant		
	High Income	Middle Income	Low Income	High Income	Middle Income	Low Income	High Income	Middle Income	Low Income
1972 (Actual)	105	106	106	105	106	106	105	106	106
1973 (Estimated)	123	122	111	123	122	111	123	122	111
1974	104	103	90	103	102	89	103	101	89
1980	104	103	89	98	97	82	88	87	70

Source: Reproduced in its entirety from IBRD Memorandum dated 5 March 1974, op.cit., Table V, p. 7.

Note: High Income countries: 1971 per capita GNP above $340;
Middle Income: $200 - $340;
Low Income: below $200.

The data presented in this Table were published in early 1974. Since then, the projections presented in it may have been revised, and the Table is presented here with this reservation in mind.

/Table 32

Table 32

AVERAGE ANNUAL RATES OF GROWTH IN THE IMPORT CAPACITY OF EXPORT EARNINGS OF 40 DEVELOPING COUNTRIES, 1973-1980

Group	December 1973 Projections	March 1974 Projections	
		High Variant	Low Variant
High Income	9.0	7.9	4.7
Middle Income	7.2	6.1	2.9
Low Income	3.9	2.6	-1.0

Source: Reproduced in its entirety from IBRD Memorandum dated 5 March 1974, *op.cit.*, Table VI, p. 8.

Note: High Income countries: 1971 per capita GNP above $340;
Middle Income: $200 - $340;
Low Income: below $200.

The data presented in this Table were published in early 1974. Since then, the projections presented in it may have been revised, and the Table is presented here with this reservation in mind.

Table 33

AVERAGE ANNUAL GROWTH RATES OF GDP OF
40 DEVELOPING COUNTRIES, 1973-1980

Group	December 1973 Projections	March 1974 Projections	
		High variant	Low Variant
High Income	7.3	6.5	3.9
Middle Income	6.2	5.3	2.3
Low Income	3.3	2.4	-0.2
of which:			
India	2.4	1.6	-0.7
Other countries	4.9	3.8	0.7
Average	6.0	4.9	1.9

Source: Reproduced in its entirety from IBRD, Memorandum dated 5 March 1974, op.cit., Table 8, p.9.

Note: High Income countries: 1971 per capita GNP above $340; Middle Income: $200 - $340; Low Income; below $200.

The data presented in this Table were published in early 1974. Since then, the projections presented in it may have been revised, and the Table is presented here with this reservation in mind.

/Several broad

Several broad conclusions flow from this brief discussion of the prospects for growth in the world economy. Clearly, the extent to which the spectre of economic disruption in both the developed and developing economies can be avoided is directly dependent on the ability of the economically developed community to forge acceptable arrangements for channeling the trade surpluses of the OPEC countries, and particularly, the Arab oil exporting countries, into international investments. Since the bulk of these investments, if realized, would be made in the developed countries, the ability of the developed countries to avoid economic dislocation in the developing countries is, then, also dependent on their success in forging another set of arrangements for channeling to the developing economies a share of the massive capital inflows which the developing countries receive from the OPEC countries. If this is not accomplished, the reduced forecast rates of growth in real GNP for developing countries presented in table 33 could become a reality.

Second, the problem posed by the huge surpluses on current account in the OPEC countries is clearly one which renders a piecemeal approach dangerous to pursue. It is an international problem per excellance. The major participants in forging the mechanisms required are the oil exporting countries, the developed countries, and the international lending institutions, including the International Monetary Fund,44/ the World Bank, the regional international banks, and the United Nations. It is still too early to judge whether the mechanisms now being considered by these parties will ultimately, be sufficient, but it is reasonably clear that from the point of view of Latin America's developing countries, the bulk of the work still lies ahead.

Third, within the group of developing economies, the terms of capital access must be distinguished. The relatively advanced economies in this group have access to international credit markets

44/ Refer to the Symposium paper which focuses on international monetary arrangements and the energy crisis.

that the lower income developing countries do not.45/ These poorer countries must rely on their meagre foreign reserves, the only other potential source of financial relief being an increased inflow of capital, largely on concessional terms, from foreign governments and international financial institutions.

Table 34 presents a rough estimate of the international financial gap for ten Latin American countries in 1974 and 1975. Some countries have access to capital markets on conventional terms which could provide an important means for closing their financial gaps in 1974 and 1975. But, this is not the case with the majority of Latin America's oil-deficit countries, and many of them will require additional credits on semi-concessional and concessional terms, if serious economic disruption is to be avoided. Table 35 presents the scale of additional financing, and the terms on which it is required, for all developing countries in 1974 and 1975.

Finally, although implicit in the previous discussion, the idea must be made explicit that the need for additional assistance by Latin American and other oil-deficit developing countries is one which, obviously immediate, will also continue at high levels over an extented period. If the current structure of world energy costs is projected, the economic problem created for those countries is a structural one, and this will require pervasive changes in the structure of product output, capital and other resource inputs. These kinds of change require relatively long periods to be realized, and hence, the enduring character of additional capital assistance. It is one thing to identify the need for the region's oil-deficit countries to accelerate the exploitation of domestic energy resources above rates anticipated only several months ago; it is quite another thing for developing countries to marshall the incremental capital resources to effect this substitution of domestic for foreign energy resources.

45/ Even in this case, however, some of the higher income developing countries may find that their access to these capital markets may be strained. These countries will be competing with the developed countries in the Euro-dollar and Euro-bond markets, for example, and in addition, the credit worthiness of many higher-income developing countries will be adversely affected by the balance of payments implications of high oil prices, making it relatively more difficult for such countries to market their bonds abroad in national markets.

/Table 34

Table 34

ESTIMATES OF 1974 AND 1975 BALANCE OF PAYMENTS DEFICITS OF TEN LATIN AMERICAN COUNTRIES, POSSIBLE SOURCES OF FINANCING FOR SUCH DEFICITS, AND REMAINING GAP TO BE FINANCED

(Millions of dollars)

Country	Current estimate of resource gap		Estimated increases in net capital transfers available to meet resource gap a/		Net additional financing required		Potential use of reserves and IMF facilities b/		Gap to be financed	
	Increase in 1974 over 1973	Increase in 1975 over 1973	Increase in 1974 over 1973	Increase in 1975 over 1973	1974	1975	1974	1975	1974	1975
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Argentina	544	400	56	112	488	288	260	131	228	157
Bolivia	-79	-92	-28	-37	-51	-55	14d/	25d/	-	-
Brazil	601	1 180	-269	-263	870	1 443	1 296	1 122	-	321
Chile c/	-5	-68	-269	-411	264	343	158	85	106	258
Colombia	-25	0	-4	-9	-21	9	107d/	111d/	-	-
Dominican Republic	-8	94	10	25	-18	69	44	13	-	56
Guatemala	87	132	19	30	68	102	42	34	26	68
Mexico	206	83	70	128	136	-45	271	191	-	-
Peru	-109	-18	-30	-48	-79	30	118	127	-	-
Uruguay	48	105	-11	2	59	103	32e/	0e/	27	103

Source: Abstracted from information presented in IBRD Memorandum dated 5 March 1974, op.cit., Annex B., Table IX.

a/ Includes net transfers of public and long-term capital, net direct foreign investment, public and private transfers, and workers remittances. Excludes autonomous private flows, reserve changes, short-term capital, and private long-term borrowing.

b/ See technical note in source document.

c/ These estimates make no allowance for any possible debt relief. All data are provisional estimates.

d/ Reserves only, since country is considered an oil exporter and therefore not presumed eligible for IMF Special Oil Facility.

e/ IMF facility only.

The data presented in this Table were published in early 1974. Since then, the projections presented in it may have been revised, and the Table is presented here with this reservation in mind.

/Table 35

Table 35

RESOURCE GAP OF THE DEVELOPING COUNTRIES TO BE FINANCED IN 1974 AND 1975, BY TYPE OF CREDIT TERMS REQUIRED

(In billions of dollars)

	Conventional terms	Intermediate terms	Concessionary terms	Total
The 40 countries				
Resource gap to be financed:				
in 1974	1.1	0.4	0.6	2.1
in 1975	3.1	0.9	1.8	5.8
All developing countries				
Resource gap to be financed:				
in 1974	1.3	0.5	0.8	2.6
in 1975	3.7	1.0	2.1	6.8

Source: IBRD Memorandum dated 5 March 1974, op.cit., Table 10, p. 17 (reproduced in its entirety).

The data presented in this Table were published in early 1974. Since then, the projections presented in it may have been revised, and the Table is presented here with this reservation in mind.

/7. The

7. The need for re-evaluating national economic prospects

The prospects for economic growth in each Latin American country which existed even less than one year ago have been profoundly altered by the increased cost of internationally traded crude recorded in late 1973. This revision in growth prospects applies not only to the nineteen oil-deficit countries in the region, but also to the five oil-exporting countries in the region as well.

While both face the common problem of domestic inflation, the first group faces the wrenching task of planning for economic growth with a now drastically reduced level of investable resources, a revised set of production costs and prices throughout the economy, and an altered set of consumer product preferences. On the other hand, the oil-surplus countries of the region face the enviable problem of managing efficiently a substantially greater volume of resources than were thought available less than a year ago, again, within the context of altered costs of production, prices and an altered set of consumer preferences.46/

The key challenge facing the region's oil-deficit countries - although in widely differing degrees, depending on the country - is an enduring one: how to cope with the threat to domestic production and employment stemming from the hemorrhaging of foreign reserves in payment for oil imports. Success in the immediate future will hinge largely on the degree to which additional external assistance can be secured and non-essential oil imports curtailed, on the one hand, and on the skill of domestic fiscal and monetary policy in combating inflation and recessionary forces, on the other.

As longer periods of time are considered, the successful confrontation of this continuing problem will require policy action along a broad front, essentially focused on four basic tasks: first, the need for promoting export earnings; second, the need for revising import and domestic investment policy to take advantage of the new

46/ The fiscal impact of the increased cost of oil on the region's oil-deficit countries is considered in other Symposium papers.

/possibilities for

possibilities for import-substitution created by the new structure of world energy costs; third, the need for cutting imports in such a way as to minimize the threat to domestic production and employment; and, finally as is the case in the immediate future, the need for increasing the inflow of foreign credits through arrangements with the oil-exporting countries, the developed countries, and the international lending institutions.

If the current structure of world oil prices continues, the oil-importing countries would find that varying portions of their capital stocks - made under conditions of substantially lower energy costs - would have been rendered economically less valuable. On the other hand, many investments that were rejected as not economically viable in the past era of lower energy costs, would now be economically viable. In the energy sector, for example, many hydropower projects that were not economically defensible only a year ago would now be highly desirable if the present structure of energy costs is projected into the future; while, on the other hand, the incentive to invest in fuel oil-fired power plants would be sharply reduced. Likewise, the pattern of economic viability of secondary industries has been radically altered by the sharp increase in world oil costs, creating opportunities for new import substitution based industries, and seriously challenging the viability of other established, energy-intensive industries. In transportation, the higher cost of energy triggers the need for reviewing the relative merits of mass transport projects as well as the desirability, from the public point of view, of present patterns of rail and road freight movements in many countries.47/

47/ These subjects and others are discussed in the Symposium paper: El Efecto del Nuevo Precio del Petróleo en el Transporte de Latinoamérica.

/It is

It is clear that the potential scope of desired structural change inherent in the projection of current energy costs would easily generate monumental requirements for foreign and domestic capital. The source of pressure in this situation is clear: the higher cost of imported oil, which is, on the one hand, the root cause of these increased investment requirements is, on the other hand, to a great extent, also the cause of the present inability of these countries to undertake these investments on the scale required. In this context, the degree of success in the area of international trade and financial policy will heavily condition the degree to which a domestic investment policy, oriented to structural change, can, in fact, be pursued effectively.

/Chapter III

Chapter III

SOME MEASURES WHICH MIGHT BE CONSIDERED BY LATIN AMERICAN OIL-DEFICIT COUNTRIES

Introduction

In approaching this discussion, it is important, at the outset, to identify two basic and interrelated fields of policy concern. The first is the field of energy-sector policy, focused on measures which should be adopted mainly in the energy sector, within the context of general economic policy, in reaction to the expected price of world crude oil. The second field is macroeconomic policy, oriented to broad economic variables, such as the level and composition of domestic output; employment; prices; imports and exports; savings and investment.

These two fields are obviously interrelated. Decisions in the field of energy policy must be taken within the broader context of macroeconomic policy as well as with respect to policy formulation in other sectors of the economy (e.g., transportation, industry, and agriculture). Pricing policy on refined oil products, for example, will, obviously, have its macroeconomic implications for the level, sectoral and product composition of domestic production, employment, foreign reserves, and so on. Conversely, macroeconomic policies, in the area of international finance will impact on prices, inputs, and output in the energy sector.

This chapter focuses on policy options open at the level of the energy sector, given the presumed macroeconomic mandate to minimize the effects of higher oil prices on domestic output and employment during the survey period (i.e., 1974-1980). Moreover, this orientation is to the policy options open from the point of view of Latin America's oil-deficit countries, since these are the ones for which the increased cost of imported oil has posed the prime threat to domestic output and employment.

/Four other

Four other issues need to be clarified: first, the expected price of world crude oil through 1980 on which this discussion will rest; second, the specific objectives of energy sector policy as discussed in this chapter; third, the level of generality on which this discussion of energy sector policy will be conducted; and, fourth, the organizational framework that will be used to discuss this subject.

It is important to specify the assumption being made about the future price of world crude oil (1974-1980) and, of course, the reasons for this assumption. The current price of the world's key crude oil, Saudi Arabian light, is, now, probably, in the range of US$ 9.00/barrel, FOB, Persian Gulf. The assumption made here is that the price (in 1974 dollars) of this crude oil through 1980 will not exceed US$ 10.00/barrel. This is US$ 0.14/barrel above the US$ 9.86/barrel weighted-average price emerging from a 40:60/oil company:Saudi Arabian government participation agreement, with a 93 per cent buy-back price, and a company margin of US$ 0.50/barrel on buy-back sales; together with the US$ 7.65/barrel figure, cited earlier, covering tax-plus-cost-and-margin on company sales of equity crude oil.

Additionally, it is assumed that the price of this crude oil during 1974-1980 will be no lower than US$ 6.62/barrel (in 1974 dollars), which is the result of applying a 5 per cent per annum rate of decline to the US$ 9.00/barrel figure just cited.48/

In summary, the price of this pivot world crude oil is not expected to rise above US$ 9.00/barrel (in 1974 dollars) during 1974-1980. Its lower limit is taken as US$ 6.62/barrel. Thus, the potential decline in the market price of this crude oil over the rest of the decade is

48/ During 1957-1970, the estimated market price (in current prices) of Saudi Arabian crude oil declined at an average rate of 3.2 per cent per annum. During this period, the major international oil companies exerted a strong, but declining influence on the price of internationally traded crude oil. During 1974-1980, the prospects are for this control to be heavily concentrated in the hands of the oil-exporting countries and the major international oil companies. Refer to Chapter I for a discussion on the major factors conditioning the decline in the price of world crude oil during 1957-1970.

/believed to

believed to be absolutely greater than the potential increase, assuming current prices to be in the range of US$ 9.00/barrel. But, even at a minimum, the international market price of Saudi Arabian crude oil (FOB) is expected to be far higher than levels recorded prior to 1974.

The reasons underlying the selection of this range require explanation. World crude oil prices falling in this range would, of course, stimulate the production of substitutes for imported oil by the oil-deficit countries as well as stepped-up defficiencies in their use of energy resources. Additionally, at a price of US$ 10.00/ barrel, the pressure on some oil-exporting countries to offer hidden discounts would be intense. The US$ 10.00/barrel figure for Saudi Arabian crude oil was taken as an upper limit in the belief that, for two reasons, the major oil-exporting countries would consider it financially disadvantageous for them to exceed it as a reference price: first, because of the presumed expectation by many oil-exporting governments that the scale of the substitution which would be triggered would work to their financial disfavour at prices in excess of this figure;49/ and, second, that, as price rises above this level, the pressure on some oil exporters to extend discounts could be irresistible, threatening a loss in control over world crude oil supply by the oil-exporting countries, and raising the spectre of a decline in crude oil prices for sellers in the international market.

49/ With price expectations in excess of (and, probably, even below) US$ 10.00/barrel, the adoption of national energy policies based on the objective of self-sufficiency in energy supplies would probably be pervasive among the energy-importing countries, especially in the developed countries. Aside from an emphasis on increased supplies of indigenous energy supplies of crude oil, natural gas, and hydropower, one could also expect a step-up in the rate of reliance on nuclear power, the introduction of new energy-conversion technologies (e.g., coal liquification and gasification), the tapping of hitherto unconventional sources of oil supply (e.g., tar sands), together with increased R/D in many other areas bearing on the longer-run growth in the world oil imports (e.g., battery-fired automobiles). After the fact, many of these investments, oriented to the objective of national self-sufficiency in energy supplies, may actually turn out to be economic white elephants. But, that would not deny the strong downward pressure on world crude oil prices which they might exert, making some of these investments, ex post, white elephants.

/The source

The source of the downward pressure on price in this case is the large gap that exists between the price and supply cost of crude oil in the world market. The major instrument for releasing this pressure is price-cutting, not only by the established crude oil exporters, but by the new entrants into the world crude oil market that these high crude oil prices will inevitably induce. On the other hand, the heavy concentration of the world's proven oil reserves in a relatively few countries and the continuing importance of the international majors would, probably, moderate the tempo of price reductions for the world's major crude oils, even if a price-cutting trend did set in.

With regard to the specific objectives of energy sector policy in the region's oil-deficit countries, the expected continuance of the increased price of imported crude oil (above recent historical levels) means a sustained, higher level of their per-unit energy costs and a sustained, heavy drain on their foreign reserves, threatening, in turn, their prospects for economic growth. Within this context, the objectives of the possible lines of action considered in this chapter are an economically defensible reduction in the unit cost of, and foreign exchange payments for, energy supplies in the region's oil-deficit countries below levels that would be implied by reliance on previously existing policies in the face of this expected price range for imported crude oil. To the extent that these two objectives are realized, the threat to domestic output and employment in these countries from the increased cost of imported crude oil may be mitigated, which, it is assumed, will be a key objective of macroeconomic policy in the region's oil-deficit countries. Conversely, to the extent that opportunities are not seized for reducing the per-unit costs of, and the drain in foreign exchange for meeting domestic energy requirements, the ensuing economic dislocation will remain unchecked by policy action in the energy sector.

/It is

It is obviously not feasible to discuss on an abstract level the subject of energy sector policy in a way that would apply on a detailed level to each of the region's oil-deficit countries simultaneously. For example, the policy recommendation to increase the production of indigenous crude oil would be absurd for the fourteen of the region's nineteen oil-deficit countries that do not now have this option.50/

The diversity of the region's oil-deficit countries, not only in terms of their energy sectors, but in terms of their economic structures as well, must be stressed at the outset. The energy sectors of these countries vary widely by the level and composition of energy production and consumption (table 18), by the importance of foreign trade in energy sources (table 36), by the scale of domestic refining capacity (table 37) and the degree of reliance on imported oil (table 9), by the structure of refined product consumption and refinery output (table 38), by the extent of control of the State over the energy industries (table 11), by the cost of supply of indigenous energy sources, by the scale and consumption of known reserves of indegenous energy resources, by the level and structure of energy prices, by the structure of taxes levied on energy products and the assignation of industry costs over refined oil products (table 14), and by the national policy parameters which condition the formulation of energy-sector policy (e.g., receptivity to foreign capital in the domestic oil industry). These country-by-country differences in the structure of the energy sector, taken in conjunction with the patently broad differences in economic structure and national policies in these same countries, stresses the need for tailoring a detailed discussion of energy policy to the individual country.

50/ Including Cuba, which does produce crude oil, but on a negligible scale.

/Table 36

Table 36

IMPORTS (CIF) AND EXPORTS (FOB) OF CRUDE OIL, REFINED OIL PRODUCTS, AND NATURAL GAS BY SELECTED LATIN AMERICAN COUNTRIES, 1960, 1965, AND 1970-1972

(Millions of US$)

Country	1960		1965		1970		1971		1972	
	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports
Argentina	123.6	0.2	102.9	8.4	75.0	7.8	98.6	8.0	64.2	5.2
Bolivia	1.8a/	3.4	1.5	0.7	1.0	13.2	1.4	23.9	1.6	41.6
Brazil	259.8	-	249.7	-	280.0	16.7	475.4	28.6	570.1	57.4
Colombia	-	73.4	-	96.9	-	74.2	-	74.6	-	59.1
Costa Rica	6.2	-	8.5	-	11.7	0.9	15.1	1.8	20.1	-
Chile	38.1	-	21.8	-	49.9	-	77.6	-	68.4	-
Ecuador	3.8	-	6.7	0.6	16.8	0.8	20.6	1.5	21.0	61.0
El Salvador	6.8a/	-	10.1	3.6	4.7	1.1	13.0	1.0	12.8	1.6
Guatemala	13.5	-	15.1	-	15.9	-	14.3	0.2	...	...
Honduras	6.0	-	12.2	-	14.7	6.2	17.5	2.9	19.2	6.9
Jamaica	17.9	-	25.2	7.5	32.6	8.1	34.0b/	8.5b/	52.1	9.2
Mexico	20.5	12.4	25.7	40.1	69.6	36.6	115.2	30.8	149.7	23.0
Panama c/	11.0a/	-	40.3	23.7	62.1	21.5	66.2	25.1	67.9	21.5
Paraguay c/	3.4	-	4.9	-	6.1	-	6.3	-	5.9	-
Peru	15.7	17.6	24.3	8.5	26.9	7.6	53.5	5.4	51.1	7.6
Trinidad and Tobago	92.7	229.6	234.5	329.4	288.0	371.3	361.4	437.2	343.9	407.0
Uruguay	28.7a/	-	24.0	-	33.0	-	32.2	-	34.5	-
Venezuela	-	2 149.0	-	2 305.0	-	2 398.0	-	2 980.0	-	2 923.7
Total	649.5	2 485.6	807.4	2 824.4	988.0	2 954.0	1 402.3	3 629.5	1 482.5	3 624.8

Source: ECLA, on the basis of official data, and ARPEL, op.cit. (Table 11).

a/ 1961.

b/ Estimate.

c/ Imports FOB.

/Table 37

Table 37

REFINING CAPACITY IN SELECTED LATIN AMERICAN COUNTRIES, 1960, 1965 AND 1970-1972

(In TB/D)

Country	Refining capacity				
	1960	1965	1970	1971	1972
Argentina	237.5	423.5	456.2	629.6	601.6
Bolivia	11.2	12.2	23.1	22.8	21.7
Brazil	208.1	364.9	504.6	564.0	718.3
Colombia	78.2	99.9	137.6	173.7	172.1
Chile	48.0	83.6	111.0	136.0	123.5
Ecuador	13.2	19.2	35.3	36.3	35.5
Paraguay	-	-	5.0	5.0	5.0
Peru	48.6	63.2	91.5	105.6	101.5
Uruguay	28.0	35.0	40.0	43.0	40.0
Venezuela	680.0	1 199.9	1 526.1	1 375.9	1 499.0
Mexico	393.0	421.0	574.2	592.0	624.5
Costa Rica	-	8.0	8.0	8.0	7.6
El Salvador	-	12.5	13.0	13.6	14.0
Guatemala	-	13.0	26.0	26.3	26.0
Honduras	-	-	14.0	14.7	14.0
Nicaragua	-	5.6	22.0	13.9	13.2
Panama	-	55.0	75.0	75.0	75.0
Cuba	86.9	86.6	93.0	93.0	93.0
Haiti	-	-	-	-	-
Jamaica	-	26.4	36.0	35.0	31.0
Dominican Republic	-	-	-	-	16.0
Trinidad and Tobago	295.0	385.0	438.0	464.2	441.0
Total	2 127.7	3 314.5	4 229.6	4 427.6	4 673.5

Source: Oil and Gas Journal (various issues).

/Table 38

Table 38

INLAND CONSUMPTION AND REFINERY OUTPUT OF SELECTED REFINED OIL PRODUCTS
IN SELECTED LATIN AMERICAN COUNTRIES, 1972

($m^3 \times 10^3$)

Country	Liquefied gas		Gasolines		Kerosene		Diesel and gas oils		Fuel oils		Total	
	Production	Consumption	Production	Consumption	Production	Consumption	Production	Consumption	Production	Consumption	Production	Consumption
Argentina	1 202	1 647	6 081	6 066	1 372	1 335	6 615	6 514	9 404	9 940	24 674	25 502
Bolivia	19	19	335	311	147	137	120	101	173	117	794	685
Brazil	2 053	2 760	11 620	12 054	1 706	1 656	8 858	7 956	11 861	9 636	36 098	34 062
Colombia	318	318	3 212	2 766	715	700	1 654	1 065	2 878	1 193	8 777	6 042
Chile	854	696	1 896	1 861	752	754	830	909	1 561	1 858	5 893	6 078
Ecuador	8	10	568	614	193	189	357	336	458	390	1 584	1 539
Mexico	2 342	4 330	8 920	9 914	2 415	2 450	5 485	6 040	8 286	7 950	27 448	30 684
Peru	130	125	1 740	1 858	946	938	1 057	1 041	1 517	1 662	5 390	5 624
Uruguay	47	69	343	353	235	245	393	445	816	865	1 834	1 977
Venezuela a/	600	500	4 741	4 695	2 859	963	8 610	1 793	39 468	3 809	56 278	11 760
Total	7 573	10 474	39 456	40 492	11 540	9 367	33 979	26 200	76 422	37 420	168 770	123 953

Source: ECLA, on the basis of official data.

a/ Consumption includes bunker sales.

/A country-

A country-by-country approach to the discussion of energy sector policy obviously cannot be taken in this brief paper. Instead, a more general approach must be adopted. It will examine the policy options that are potentially open, in general, in the region's oil-deficit countries in their attempt to achieve the two objectives of energy sector policy just specified.

For purposes of discussion, the energy sector policies open, in general, to Latin America's oil-deficit countries for coping with the expected price of world crude oil through 1980 should be examined in the following two broad categories:

(a) Action oriented to decreasing the demand for imported oil;

(b) Action oriented to reducing the supply cost of imported oil and which should be considered in a broad context of international trade relations.

The former is mainly reviewed in this study.

1. Options oriented to decreasing the demand for imported crude oil

The assumptions that the price structure for world crude oil through 1980 will be based on a price for Saudi Arabian light ranging between US$ 6.62-US$ 10.00/barrel, FOB, Persian Gulf, in 1974 prices, means that the drain of foreign reserves on oil account now impacting the region's oil-deficit countries - although varying wiedely by country - is expected to be an enduring one.

If the previously existing structure of refined product prices in the domestic economy does not respond to this situation, then, in some of the region's fourteen oil-deficit/non-oil-producing countries, that drain cannot endure too long simply because they will quickly reach the point that their foreign reserves will not be sufficient to satisfy the physical demand for oil imports generated under the old structure of refined product prices. At that point, which is already imminent in some of these countries, drastic action will be required in the energy sector to minimize the constraint imposed on total output and employment by the cost of imported oil.

/In the

In the region's five oil-deficit/oil-producing countries, this threat, while already predictable, is less immediate, although, again, the immediacy varies widely by country: in the case of Chile, it is already evident, while in the case of Argentina and Brazil, it is further removed.

The first imperative, then, is to reduce the demand for imported crude oil and imported refined products, but in such a way as to minimize the threat to domestic production and employment.

With the exception of Guyana and Haiti, each of the region's oil-deficit countries satisfy their domestic requirements for refined oil products by refining imported crude oil (and, in five countries, indigenous crude oil as well), closing the difference between refinery output and domestic requirements in the foreign market (and by inventory changes). Typically, refining strategy in these countries is based on the objective of minimizing imports of motor gasoline so that, in effect, the production of motor gasoline, given a more or less inflexible refinery technology, determines the domestically produced supply of other refined products. For several reasons, operating on the domestic demand for motor gasoline is of particular strategic importance for countries seeking to minimize their drain of foreign reserves on oil account:

- First, this product typically accounts for about one-third of refined product consumption in the region's oil-deficit countries.
- Second, it represents the major potential for cut-backs in domestic oil consumption with relatively less of a threat to domestic production and consumption than in the case of other refined oil products. By comparison, if supplies of fuel oil, diesel oil, or petrochemical naphthas, for example, were physically restricted in the economy, the threat to total output and employment would be far more serious.

/- Third,

- Third, although reduction in the demand for motor gasoline might cause imbalances between the requirement for "essential" refined oil products and their domestically produced supplies, this problem can be dealt with through imports of those deficit volumes. Additionally, the mix of crude oils can be changed in line with revised refinery target yields; and further improved, in this regard, by the importation of spiked crude oil.

One difficulty in operating on the demand for motor gasoline is that, even if the incremental cost of imported crude oil were passed forward, through existing cost allocation and tax systems, to consumers, the resulting increase in the price of motor gasoline may not constitute much of a brake on the rate of its consumption (i.e., even at its higher price, consumers would find it financially desirable to use it in satisfying their private transportation requirements, for example). The rough calculations presented in Chapter II suggest that, with an increase in the cost of imported crude oil from US$ 2.20 in early 1973 to US$ 10.00/barrel (FOB, Persian Gulf), in 1974, the price of motor gasoline would rise from about US$ 0.11/litre to US$ 0.18/litre, including a mark-up on the increased cost of that crude oil. This higher price for motor gasoline may not constrict its consumption significantly, leaving, to that extent, unchecked the foreign exchange drain on oil account. This problem can be attacked by setting a physical target for motor gasoline supply in the economy (derived as a function of projected foreign reserve balances), and rationing this volume of motor gasoline by the price mechanism through increased taxation of motor gasoline. This approach would increase the cost of private road transportation, inducing a substitution of lower-unit cost public transportation for private transportation services, and husbanding foreign exchange on current energy account in the process. Facilitating a relative shift over time from private to public transportation services would, of course, call for forward planning on a co-ordinated basis between policy-makers and technicians in the transportation and energy sectors.51/

51/ Refer to Symposium paper entitled: El efecto del nuevo precio del Petróleo en el Transporte Latinoamericano.

A second major way for restricting the growth in the domestic demand for imported oil is an increase in the supply of lower-cost indigenous energy substitutes. Given the assumptions made earlier about the price of imported crude oil, the implication is clear that many energy-supply projects, based on indigenous fuels, that were not economically viable in the past will be viable now, both financially and economically.

The problem in this area of action is essentially one of timing, since it will take several years before such projects become operational. Economically defensible investments in hydropower and nuclear facilities, natural gas transmission and distribution facilities, coal production and marketing projects, for example, have long lead-times, and they cannot be expected to provide much in the way of economic relief in the region's oil-deficit countries during the seventies. The major difficulty is not in identifying such projects, but rather, as discussed in Chapter II, in financing them.

In the immediate future, however, a complete review is required of energy projects now in the pipeline. It may be possible to convert some electric power generating projects, for example, from a previously planned reliance on refined oil products to indigenous fuels, or to eliminate some oil-based projects now for a reliance on indigenous, lower cost fuels in the relatively near future. Additionally, it may be possible to reduce imports of pleasure automobiles in some countries, conserving foreign exchange not only on oil account but, in a quantitative sense, quite importantly, on capital account as well.

Much of the potential for indigenous fuel substitution is concentrated in the electric power industry.52/ The revision of prices for refined oil products discussed previously has its counterpart need in this industry as well, and, again, under the mandate to conserve

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52/ The implications of the increased cost of world oil to the region's electric power industry are discussed in the Symposium paper entitled: Los nuevos precios del petróleo y la industria eléctrica en América Latina.

foreign exchange and lower unit-energy costs in such a way as not to threaten domestic production and employment. Given the cost of heating equipment and the structure of household electricity tariffs, changes in the price of refined oil products could induce inter-fuel substitutions that, from the point of view of conserving foreign exchange, could be undesirable.53/ In a strategic sense, the major candidate for increases in electricity tariffs is the quantitatively important household sector (table 15), because relatively major economies are possible in this component of the market without too much of a threat to output and employment. The need is particularly strong in the oil-deficit countries to the extent, that their electric power industry is based on oil-fired generating plants.

Aside from the substitution of indegenous energy sources for oil in the generation of electric power, the increased cost of world oil has made investments in upgrading the efficiency of electrical transmission and distribution systems even more attractive than in the past. Table 15 indicates the relatively high ratio of system losses to generated power in the region's oil-deficit countries. Again, as in the case of projects oriented to the increased use of indigenous fuels in generating electric power, the major problem involved in efficiency-upgrading projects is not so much in identifying them as in financing them.

A particular premium is attached to the increased supply of lower-cost indigenous crude oil, and, here, the prospects vary widely between the region's oil-deficit countries.54/ As noted previously, only five of them produce crude oil. These countries can increase their production and development activities immediately, reducing

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53/ For example, if kerosene prices were increased sharply in order to dampen the growth in oil imports while household electricity tariffs were not changed, consumers might shift out of kerosene heating to electric heating. If the power industry, in this case, were heavily reliant on fuel oil and diesel-fired plants, this could generate a counterproductive increase in the demand for imported oil.

54/ Refer to an extended treatment of Latin America's oil resources in the Symposium paper on this subject.

/the claim

the claim on foreign reserves of imported oil. Given the expected range of world crude oil prices through 1980, production from existing fields and development of known fields can be accelerated sharply and, despite rising unit costs, still be economically defensible over a broad range of incremental output. To the extent that the production of indigenous crude oil can be increased rapidly in the context of strong downward pressure on domestic oil consumption, it might even be possible, in one or two of the region's oil-deficit countries, to sell some supplies of indigenously produced crude oil at its opportunity cost in the world market.

The remaining fourteen oil-deficit countries face the choice of continuing reliance on imported oil, launching indigenous exploration programmes, or, as will be discussed subsequently, investing in oil projects abroad. The lack of geologic knowledge, in many of these countries, of their oil (and energy) reserves, taken together with the long lead-time involved, even when an oil exploration programme is successful, implies that the region's non-oil producing countries cannot rely on this source of economic relief in any significant way during the seventies.

The third way of decreasing the demand for imported oil is through efficiency increases in the energy systems that will remain committed to its use. Other than electrical generation, transmission, and distribution facilities in the power industry as just noted, the major energy systems involved here are the automobile, truck, bus, locomotive, ship, aeroplane, industrial boiler, and home heating system. Laws have been passed in the United States, for example, reducing maximum driving speeds to increase average distance achieved per litre of motor gasoline input, and proposals have been made to permit tax deductions for improving home insulation systems. The list could be expanded easily: inspection programmes could be introduced with a purpose of upgrading the thermal efficiency of automobiles, trucks, and buses, etc.; the cruising speed of aircraft could be regulated with a purpose of increasing their efficiency of energy use; inspection programmes could be introduced, designed to increase the efficiency of fuel use in industry, and so on.

By and large, these kinds of proposals have received more praise than they deserve. At best, they will probably secure little, if any, in the way of economically defensible savings of oil beyond what would be secured by the natural reactions of consumers to increased prices for refined oil products. The incentive to increase the efficiency with which consumers use a fuel is a function *inter alia* of its price, and it is far simpler for governments to achieve the goal of increased efficiency in oil consumption by operating on the price of refined oil products directly rather than by instituting grand programmes trying to force consumer behaviour to this end. At relatively low prices for motor gasoline and diesel oil, for example, the financial incentive for engine tune-ups is not as strong as at relatively higher prices. As the price of electricity, kerosene, natural gas, and other household fuels is increased, so is the incentive to economize in their use.

One area for efficiency gains that does warrant immediate examination is the possibility for the government to transport relatively more of its freight by train than by truck. Capacity conditions permitting, this could generate desirable economies in energy-input per unit of freight transported and conserve foreign exchange.55/ Additionally, over longer periods of time, it may be economically feasible, in some countries, to install diesel-electric locomotives and trolley-bus systems, for example, and to gear the expansion of hydropower facilities to the introduction of these energy systems. Again, co-ordination between the energy and transportation sectors is essential in evaluating such possibilities.

Another area for potential efficiency gains is the interconnexion of domestic electric power systems. The higher cost of oil makes investments in such interconnexions even more feasible now than in

55/ This possibility, together with a variety of others, for economizing on fuel use in the transportation sector are discussed in the Symposium paper: *El efecto del nuevo precio del petróleo en el transporte latinoamericano.*

/the past.

the past. In countries using hydropower (and other indigenous fuels) together with imported oil in generating electric power, such investments would retard the rate of increase in (or lower absolutely) unit-energy costs and, in the bargain, conserve oil. Even in systems wholly reliant on oil-fired generating plants, unit-oil requirements could be reduced by concentrating generation in larger-scale and more efficient plants. Again, the lead-time involved in such projects may not permit economies in oil consumption that would be very significant during this decade, and the problem may not be so much in identifying such innovations as in arranging for their financing.

One broad imperative flows from the previous discussion: the need to deal with the problem of restructuring the prices of final energy flows to consumers on an integrated basis, not only in the context of refined oil product prices, but between these products and other energy sources (i.e., electricity, natural gas, and coal) as well. Within the oil industry, the price of motor gasoline cannot rationally be set in isolation from the price of diesel oil; or the price of household kerosene without reference to the price of other petroleum liquids sold to the household heating market. Similarly, the price of fuel oil cannot be fixed in isolation from the price of natural gas and coal in the industrial boiler market; nor the price of petrochemical naphthas without respect to the price of natural gas sales to the petrochemical industry.

In short, what is required is a co-ordinated approach to the now-intensified requirement for energy planning in the economies of the region's oil-deficit countries, proceeding from an overall strategy of economic development to the critical assumption on world crude oil prices over time, to desired patterns of fuel use and, then, to the investment required in the energy sector (and in other key sectors, such as transportation, as well) and focusing explicitly on the structure of energy prices required to support those patterns of fuel use over time. This need is evident throughout the world of oil-deficit countries. But, in some Latin American countries, the rigidity of fuel use patterns and the relatively small volumes of "non-essential" energy consumption makes a co-ordinated approach to energy planning essential if the major surgery that lies ahead in the use of energy supplies in these countries is to be pursued efficiently.

There are two other major lines of action open now for planning in this area: first, the joint development by Latin American countries of their hydropower reserves; and, second, interconnexions of electrical systems across national frontiers.

By the substitution of hydropower for oil-based supplies of electricity and by the substitution of lower for higher-cost energy inputs, the region's oil-deficit countries can potentially retard the rate of increase in the cost of supply of domestically produced electricity, and, in the process, conserve foreign exchange.56/

But, once again, these two kinds of projects realistically cannot be expected to provide much of a depressant on the rate of growth in the demand for imported oil during the seventies. The lead-time is too long for this, and, especially in the case of multi-national projects for the development of hydro-reserves, many of the oil-deficit countries may find the capital requirements prohibitive unless external assistance is provided on semi-concessional or concessional terms. But, this does not deny the importance of initiating planning now for the possible introduction of such projects in the future.

56/ The recent record of progress and the prospects for further co-operation in the joint development of hydropower capacity in the area and for system interconnexions are discussed in the Symposium paper focusing on the ramifications of the energy crisis to the region's electric power industries.

/2. Observations

2. Observations on some lines of action which may contribute to reducing the cost of crude oil

The previously discussed policy measures had as their immediate objective an economically defensible retardation in the rate of growth in the demand for imported oil. The instruments potentially open for achieving this objective included excise taxes on refined oil products, the substitution of indigenous fuels for imported oil, efficiency gains in the use of refined oil products, and, internationally, regionally-oriented hydropower and interconnexion projects.

The aspects or policy considered in this section are oriented to the immediate objective of securing supplies of imported oil at lower unit costs in order to retard the rate of increase in per-unit energy costs and to conserve foreign exchange.

Several options are open to the region's oil-deficit countries in attempting to reduce the cost of their imported oil: first, the normal playing-off of sellers by buyers in the international oil market; second, the application of excise taxes on refined oil products (noted in the previous section in another connexion); and, third, measures based on the use of greater centralized control by Latin American governments over their domestic oil industries.

The playing-off of sellers by buyers (and not just by Latin American buyers) in the world oil market constitutes one of the major hopes of the oil-deficit countries for securing reductions in the price of their imported oil supplies. Prior to the seventies, this involved, for the most part, pitting the international major oil companies against one another and each of them against the international minors and oil exporting governments, which were long on crude oil and short on downstream outlets for it. Since then, control over the supply of world crude oil has shifted progressively to the oil-exporting countries.

The prospect is for the oil-exporting countries to increase their control even further during the rest of the decade and, in many countries, to remain closely allied with the international oil

/companies in

companies in terms of their underlying commercial need for each other. Hence, at the margin, the success of buyers in the international oil market will, as in the past, reflect their skill in playing-off the oil companies against one another, but it will reflect, more and more at the margin, the successful development of other methods of operation, such as direct purchases from the governments of oil-producing countries.57/ In this way, as well as avoiding intermediaries, more comprehensive trade operations may be carried out between governments, which will enable the buyers to effect additional exports and place them in a more favourable position vis-à-vis oil purchases.

From the point of view of the oil company operating in the oil-exporting country, the minimum price it must secure, if supply is to continue, is tax-paid-cost, with cost now including the impact of the acquisition cost of "buy-back" crude oil in countries where, such crude oil arrangements exist between the oil company and the host country and, of course, where they are executed. Tax-paid-cost of Saudi Arabian equity crude oil, for example, is about US$ 7.15/barrel (i.e., US$ 7.00 tax and US$ 0.15 cost per barrel: refer to table 6); and for buy-back crude oil the cost of acquisition to the oil company is on the order of US$ 10.83/barrel (i.e., 93 per cent of posted price, or 0.93 x US$ 11.65/barrel). With a 40:60/company: country selling mix prevailing, the weighted average minimum price for this crude oil, below which supply would cease, would be US$ 9.35/barrel, FOB, Persian Gulf (i.e., 0.40 x US$ 7.15 plus 0.60 x US$ 10.83/barrel). Between US$ 9.36 and US$ 10.83/barrel, the host government, if it chose to, could sell its crude oil to the international oil company under the participation

57/ In early 1973, a contract was signed providing for the direct sale of a portion of Abu Dhabi's participation crude oil to a Japanese shipping and trading company. Deliveries would begin in 1973 at a level of about 30,000 barrels/day, reaching more than one-half million barrels per day in 1980. Refer to: World Petroleum Report, 1974 (Vol. XX), p. 41. Direct sales of participation crude oil such as this constitute a major vehicle for obtaining more favourable prices.

/agreement; and

agreement; and with market price above US$ 10.83/barrel, the government might choose to sell it independently. In other words, if this set of supply conditions did define the situation, the oil company operating in Saudi Arabia could continue supplying crude oil (equity and buy-back combined) until the point that price declined to about US$ 9.36/barrel;58/ but, below this level, the government would apparently have to reduce its revenues per barrel, if sales by the oil company were to continue.

Two implications seem clear: first, strong reductions in the price of internationally traded crude oil from present levels would eventually require the assent of host governments to reductions in average revenue per barrel; and, second, the action oriented to securing this assent would be the bargaining between either (a) the oil-deficit countries and the oil companies in oil exporting countries directly, or (b) between the oil-exporting and oil-importing countries directly, or both.

Essentially the problem facing the region's oil-deficit countries is the practical one of meeting the physical and financial requirements for their continuing oil imports, on the one hand, without foreclosing the possibility of securing reductions in the future unit-costs of those imports, on the other. One major issue involved in striking this balance is the treatment of crude oil imports under long-term purchase contracts.

A consideration of the forces discussed earlier in this chapter suggest that the probability of a decline in crude oil prices from present levels during the seventies is higher than for an increase, which in turn suggests that two important measures should be considered: first, the inclusion in any long-term oil supply contract concluded by the region's oil-deficit countries of clauses stipulating that

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58/ Obviously, this does not imply that the oil company would sell its crude oil at average tax-paid cost for equity and participation crude oil, nor, as noted earlier, that the host government would exercise its full entitlement to its participation volumes of crude oil.

prices should be revised in line with any changes in the international markets; and, second, the introduction of legislation to this effect in the region's oil-deficit countries in which oil import commitments can presently be made by refinery affiliates of international oil companies without the approval of the central government.

The imposition of excise taxes on refined oil products, especially in countries with large oil markets, may induce a downward movement in oil import prices, if they are levied along a broad front by large-scale crude oil importing countries. The move is a necessary one in many of Latin America's oil-deficit countries due to the erosion of their foreign reserves, as discussed previously. In this context, excise taxes on refined oil products also have the potential advantage that sellers may decide to absorb the taxes, lowering the acquisition cost of oil imports.

The third route for trying to secure reductions in the unit cost of imported oil involves two kinds of action: first, centralization of oil imports in the hands of the oil-deficit governments, where this control is not presently existent; second, reduction in the unit cost of crude oil as booked into the refining affiliate of an integrated international oil company at prices above those in the arms-length, competitive segment of the international oil market.59/

Where the sole domestic buyer of imported oil is an affiliate of an international oil company, there is no competition between it and its parent crude oil exporting company, and the price of the crude oil transferred is not a price in an economic sense. Centralization of oil imports in State hands has the potential advantage of reducing the price of oil imports by introducing competition between the crude oil buyer (now the State) and the crude

59/ The potential usefulness of these options does not extend to all oil-deficit countries in the region because many of them do not have a foreign sector in their domestic oil industry (refer to table 10). Nevertheless, those options are open potentially to many of the oil-deficit countries in the region, particularly in Central America and in the Caribbean.

/oil seller.

oil seller. Additionally, where domestically owned companies are purchasing their refined oil product requirements directly, but in a piecemeal fashion, centralization of such purchases in State hands may provide a means of reducing the average cost of imported oil.

In a small country, however, the centralization of oil purchases may not be sufficient to secure the better prices obtained by large-scale buyers as a result of their stronger bargaining power. The possibility might therefore be explored of a small country with a limited import capacity, which is nevertheless in State hands, combining its oil purchases with those of a large-scale imported in the region also operating through State enterprises.

If the price of crude oil, as booked into the domestic refining affiliate of an international oil company, is above the price of that crude oil as recorded in the arms-length component of the international oil market, one option immediately open to the government for closing this gap is to legally establish the price in the most competitive component of the world oil market as the reference price for booking imported crude oil into the domestic refinery, and, at the same time, allowing the refinery a margin sufficiently above cost to ensure a continued supply of refined oil products to the domestic market. Such an approach could potentially stem the drain in foreign exchange on oil account and increase the tax contribution of the foreign, integrated oil refinery to the central government, without necessarily impeding the flow of refined oil products to the domestic market.

In addition to the kind of action referred to, there are others that are more closely related to international co-operation in the fields of trade, finance and the economy in general. These aspects are not dealt with here as they would require a much wider context extending beyond the specific objectives pursued in this document.

3. Summary

This chapter examined a variety of energy-sector policy actions open now to the region's oil-deficit countries to confront a situation in which the price of world crude oil is based on a range of US$ 6.62-US$ 10.000/barrel, for Saudi Arabian crude oil, FOB, Persian Gulf.

/Actions were

Actions were divided into two classes: first, those designed to reduce the demand for imported crude oil; and, second, those designed to decrease the supply price of imported crude oil.

These options were considered from the point of view of the region's oil-deficit countries, since these are the ones which have been negatively impacted by the increased price of world oil.

The objective of energy sector policy action specified was to minimize, in an economically defensible way, increases in the unit cost of energy supplies in the economy as well as the foreign exchange drain for energy (i.e., oil) imports that would occur if the old structure of energy sector policies were continued in the face of the increased cost of world oil. This objective was supportive of the broad, macroeconomic mandate to minimize the threat to domestic output and employment inherent in the "energy crisis".

With regard to actions oriented to decreasing the demand for oil imports, three lines of action were examined: first, excise taxes on refined oil products, and, particularly, on motor gasoline as well as on other products, restrictions in the physical supply of which would not constitute a threat to domestic output and employment; second, substitution of indigenous fuels for imported oil; and, third, measures designed to increase the efficiency with which oil (and energy in general) is used in the economy.

The case for increased excise taxes on motor gasoline and some other refined oil products is particularly strong in the region's oil-deficit countries which are now, or prospectively will be, in a difficult position in terms of foreign reserves. More generally however, there are important reasons for passing forward to consumers the higher cost of oil within a structure of cost allocation and tax incidence designed to minimize the threat to output and employment. Reductions in the demand for imported oil can be secured relatively quickly under this option, especially if coupled with sharp increases in excise taxes on motor gasoline and other refined products not critical in the sense of their link to output and employment.

/By comparison,

By comparison, the substitution of indigenous fuels for imported oil was found to provide little in the way of potential relief during the seventies, even if the region's oil-deficit countries could secure the large volumes of capital required for projects serving this purpose. In a strategic sense, the options in this area have a longer term importance.

Finally, there were a number of measures which governments could take to promote efficiency gains, other than a basic reliance on the price mechanism for this purpose. But, again, some of these measures have relatively long lead times. On the other hand, shifting public freight from road to rail media presents an opportunity, in many of the region's oil-deficit countries, for relatively immediate gains in the efficiency of oil use.

Two other options bearing on the demand for imported oil were examined: multi-national development of hydroelectric resources and interconnexion of electrical systems across national frontiers. Both are essentially longer-term in their potential impact on oil imports, and both raise the problem of securing considerable amounts of capital for their realization.

On the supply side, options were examined for reducing the cost of oil imports: first, the normal response of buyers to play-off sellers in the world oil market; second, increased taxation of refined oil products; third, centralization of oil imports in State hands in countries where this is not presently the case; and, fourth, applicable only in some of the oil-deficit countries, the replacement of transfer prices by competitive prices as the basis for costing crude oil into the domestic refining affiliate of an international oil company. Each of these measures is relatively immediate in terms of its potential impact.