



SEAS

DISCUSSION PAPER NO. 111

THE GLOBAL ENERGY PROBLEMS
AND JAPANESE CRISIS MANAGEMENT POLICIES

by

Shinichi ICHIMURA

April, 1981

The Center for Southeast Asian Studies

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The Global Energy Problems
and Japanese Crisis Management Policies

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The Global Energy Problems and Japanese Crisis Management
Policies

Shinichi Ichimura*

1. Three Possible Courses for Energy Situations

There are three possible courses of development for global energy situations in the 1980's. The first is the one in which the oil price will keep on rising in real terms so that oil-importing countries must slow down their growth rates to cope with resultant domestic inflation and unfavorable balance of payments. But in this course the serious disruptions of oil supply does not occur, and even the slacking demand and supply conditions are conceivable at a time of recessions. This is the most peaceful course of probable events for which ordinary economic policies should be considered adequate. If one can really believe in the possibility of this course only, then no serious crisis management policies are needed. The second course is similar to the first, except that once or several times the disruption of oil supply like the one caused by Iranian situation in 1979 takes place. Then, the world market of oil will be seriously shocked, and the oil price and supply will be seriously disturbed. The extent of disturbance seems very uncertain. This is

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[1] Shinichi Ichimura & Kazuya Fujime, Oil Energy Problems and National Security, Institute for Peace and Security, Tokyo, 1980.

[2] Shinichi Ichimura, "Economic Security" in Peace and Security for Japan, ed. by S. Eto et al., Hara Shobo Co., Tokyo, 1980.

[3] Shinichi Ichimura, "Energy Problems and National Security Policies", Toyo Keizai Shinpo Weekly, Tokyo, August 1980.

the situation of uncertainty and swing which is the most probable to occur according to most experts' opinions. ^{1.}

The third course is the situation in which a serious disruption of oil supply, at least over three months or longer, takes place and the oil market is thrown into complete confusion. This is the situation of crisis. In this case it is almost certain that some military action is going to be undertaken by some country. Some experts in the U.S. seem to think that the disruption over 6 months leads unevitably to war. Even in the second course, however, there may appear a serious political and military threat under some circumstances. The first course described as the peaceful one may also imply a serious situation to some countries, if not to Japan or big powers. A number of LDC's may be badly affected, so that the internal economic and social instability may bare even an international recession. Hence, in all cases it is highly desirable for any responsible government to prepare a set of policies so that it may be able to meet such serious situations. The so-called crisis management policies are necessary to meet this requirement.

The crisis management policies must be always coordinated with other, ordinary economic policies, so that this discussion on crisis management need to proceed in balance with those on fiscal and monetary policies in the first course. The crisis management policies must always consider the socio-economic and political implications of oil crisis and the requirement of national security.

2. Geopolitics of Oil, Food, Industrialization and Arms Trade

There are several reasons why the oil problem is particularly colored by politics. Firstly the oil and gas resources are concentrated so much in the Middle East which is such a "volatile, unstable and crisis-prone Area". The countries in the area are not populous and do not always need to increase the oil

1. The best analysis of Japanese Energy crisis management policies before the second oil crisis is given by Nomura Research Institute, A Comprehensive Study of Energy Crisis Management in Japanese, Sogo Kenyu Kaihatsu Kiko, Tokio 1979. This report gives the results of a survey on 32 experts on the likely situation in the 80th. Some of these survey results are quoted in § 6.

production with increasing demand. The regional distribution of oil supply according to the latest comprehensive study by R. Nehring, is given by table 1. The economic indicators of Middle Eastern countries are shown in table 2.

Table 1: Regional Distribution of Oil Supply

Region	Assured	Potential	Total
North America	1.798	1.000~2.000	2.800 ~ 3.800
South America	684	520 ~ 920	1.200 ~ 1.600
West Europe	246	250 ~ 450	500 ~ 700
East Europe & SU	1.024	630~1.230	1.650 ~ 2.250
Africa	756	450 ~ 940	1.200 ~ 1.700
Middle East	5.099	3.500~6.300	8.600 ~ 11.400
Asia & Oceania	508	540~12.880	1.050 ~ 23.000
Total	10.115	6.880~12.880	17.000 ~ 23.000

Source: R. Nehring: "Giant Oil Fields & World Oil Resources,"
Rand Corporation, June 1978

Table 2: Economic Indicators of ME countries

	Polit. System,	Popul. '70,	Export '70,	Import '70,	GNP '70
1. Irak	military	9.4	1,099	509	28.6
2. Iran		28.7	2,354	1,658	128.0
3. Saudi Arab.	Monar.	7.3	2,360	750	29.3
4. Kuwait	Const.Monar.	0.7	1.581	625	23.5
5. Egypt	Repub.	33.3	162	778	64.0
6. Syria	"	6.1	203	360	16.6
7. Turkey	"	35.2	578	577	128.9
8. Arab. Emer	Tribal	0.2	-	-	-
9. Yemen	Repub.	5.7	4 *	32	2.5
10. Lebanon	"	2.8	172	577	15.0
11. Jordan.	Const.Monar.	2.3	34 *	184	5.6
12. Bahren	Tribal	0.2	42	122	-
13. Qadar	?	0.1	-	-	-
14. Ohman	Monar.	0.8	- *	-	-
15. South Jemen	Repub.	1.5	140	227	1.5
16. Afganistan	Military	17.0	86	73	0.1
17. Israel	Repub.	3.0	130	1.431	48.0

1) Pop. million; Exp.& Imp. million US \$; GNP 0.1 bill. \$

* are for 1969

2) Information is for 1970-72

3) Needless to say, Iranian situation completely changed.

The Middle East borders on USSR, so that in emergency it may be swept away by one stroke. Such a possibility must be kept in mind. In general, the geopolitics of resource distribution must be analyzed with great care¹⁾, and it is related not only to such a critical conflict between superpowers but also to various confrontations between USSR and USA, North-South problems, multipurpose usage of oceanic space and border conflicts among different countries. It is normal, therefore, that bilateral confrontations and potential conflicts on the ways of establishing the regional framework in all the areas from the Aege Sea to the South China Sea are receiving an intense attention.

Secondly the economic power of the US as a core of stabilizing forces in the world has relatively receded, and her dependence on imported oil suddenly increased in the 1970's. Table 3 dramatically demonstrates the fact with the figures of major countries. The US dependence on imports is equally serious regarding other mineral resources. Table 5 shows one calculation in this and next decade. Surprisingly she depends already 50% on imported iron ore.

Table 3 : Degree of Dependence on Imported Oil

	'60	'70	'75	'77
USA	19.0	24.4	40.2	49.1
Japan	98.5	99.6	99.8	99.8
West Germany	83.5	94.2	95.7	96.4
UK	99.8	99.9	98.5	68.6
France	93.6	97.2	99.1	99.2
Italy	93.7	96.9	99.0	99.0
Canada	45.0	36.5	34.3	32.5

Source: OECD: Energy Balances

1) Melvin Conant, Geopolitics of Energy, Westview Press, 1978.

Table 4: Degree of Dependence on Imported Mineral Resources and their Suppliers

	50	70	85	2000	Main Suppliers	LDC	
Bauxite	64	85	96	98	Jamaica	53.5	
					Surinam	27.4	88.2
					Guyana	7.3	
Copper	31	?	34	56	Peru	23.2	
					Chile	14.7	37.9
Iron Ore	8	30	55	67	Venezuela	30.6	
Manganese	88	95	100	100	Gabun	26.3	
					Brasil	18.8	55.5
					Zaire	10.4	
Tin	77	?	100	100	Malaysia	64.3	
					Thailand	23.3	96.5
					Bolivia	8.9	
Tungsten	?	50	87	97	Peru	12.0	
					Thailand	9.0	39.2
					Bolivia	18.0	

Source: L.R.Brown, World without Border, Random House, New York,

Since many of the trade-partners are mainly developing countries, she must be more careful in dealing with LDC's and the security of trading lanes. All these resource problems require the US to take the cautious considerations of the interdependence among friendly industrialized countries, oil-producing countries and resource supplying LDC's. Despite the declining importance of American relative position in the world economy, the US policies to cope with these situations are of vital importance to Japan as well as any Western country, and their policies must very carefully be coordinated with the US policies.

Thirdly, the oil crisis occurred along with three other fundamental disequilibria in the world economy: (a) disequilibrium between food and population, (b) disequilibrium of aggregate demand and

supply demonstrated by secular trend to inflation, (c) disequilibrium between demand and supply of international currency. These four disequilibria are fundamental because they are closely related to the institutions and structure of the world economy now. Their solution seems to require the institutional reform in each country as well as the international system. The policies to cope with the oil crisis must be examined not only in its own light but also in view of the effects on the other fundamental Problems. Often the causes which make the solution of these four problems difficult are common and interrelated, so that the solution of one problem may contradict with or facilitate the solution of other problems.

Fourthly, the oil crisis has affected also the countries in the Communist bloc the same way as the West.¹ Almost all the Socialist countries are dependent on the oil imported from the Soviet Union, so that they have been suffering from the higher oil prices. Solidarity of socialism did not prevent the Soviet from changing the Eastern Europe countries the world market price. They are suffering from inflation and staggering growth. This may be affecting in turn the Soviet economy. The Soviet economy, however, seems to benefit more from the higher price of oil as an oil-exporting country and her power of influence has increased in the Middle East as well as Eastern Europe. The CIA report² has pointed out the possible decline of oil production in the Soviet Union around 1985, which has been denied by the Soviet authorities. They admit, however, that the location of new oil fields is moving to the north-east and the cost of explorations is increasing. It is conceivable, therefore, that she may not be able to supply oil to Eastern Europe as much as they want. For this reason conflicts between Eastern Europe and the Soviet Union may increase in the 80's.

The Soviet Union and Eastern Europe have other weaknesses; the shortage of food, the slow-down of industrial growth and the increasing dependence on Western capital market. From 1973 to '76 the Soviet Union and East European countries borrowed more than

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1. J.R.Lee & J.R.Ricky, "Soviet Oil Development" in Soviet Economy in Time of Changes, US Congress, Joint Economic Committee, Oct. 1979
 2. CIA, The International Energy Situation: Outlook to 1985, April 1977

7 billion dollars, and the amount in early 80's is expected to be more on the annual average. If these loans are not available, the growth rates of Socialist economies must pace down.

All these and other considerations must be taken together to evaluate the changes in geopolitics of the world economy, and the economic and other policies must be prepared to overcome the difficulties imposed by oil crisis. The general picture of some changes is summarized by Table 5.

Table 5: Changes in Economic Power
related to security

	<u>Energy</u>	<u>Food</u>	<u>Industry</u>	<u>Arms</u>
1. USA	-	+	0	+
2. USSR	+	-	-	+
3. Canada	+	+	0	+
4. West Europe	-	0	+	+
5. Japan	-	-	+	0
6. Australia	+	+	-	0
7. China	+	-	-	0
8. East Europe	-	-	-	-
9. OPEC	+	-	-	-
10. Non.oil prod.LDC	-	-	-	-

* +, -, 0 means favorable, infavorable, no change due the oil crisis.

As for energy, USSR, Canada, Australia and China as well as OPEC became very advantageous, but except for USA, Canada and Australia all the countries have serious problems in food supply. USSR and China are steadily importing more than 10 million ton of grains every year. Other Socialist countries, Western Europe, Japan and non-oil-producing LDC's suffer from the high price and shortage of energy and food alike, but Western Europe and Japan can cope with the situation by exercising their industrial strength. Non-OPEC LDC's whether they are in the free world or in the Communist bloc, are truly "have-not" and must seriously affected by oil crisis.

One peculiar effect of oil crisis is the increased importance of arms trade. Due to the internal and international instability, most OPEC countries are greatly interested in their national securities, so that the countries with the capacity to export the armaments obtain the effective leverage in dealing with OPEC's. Table 5 gives an assessment of overall changes in these matters in the 70's. The crisis management policies of any country must respond to such changes in the future as well as in the past.

3. The Roles of Majors and OPEC

There are some special aspects of the demand and supply of oil. The first is the fact that oil-supply countries are not homogeneous. Most of them belong to OPEC, but some do not, as US, UK, USSR, Mexico, Venezuela etc. do not. The second is that even among OPEC members, their national interests are not congenial. It was proved by the fact that at a time of Middle Eastern War Libya, Algeria, and Iraq did not practise the oil embargo. Furthermore, there are enough number of countries like Iran, Iraq, Algeria, Libya, Indonesia, Nigeria, Venezuela, Peru, Ecuador which have large populations and suffer from low percapita income, so that even with a sharp rise in price they do not restrict but maintain the production levels, and thereby obtain the necessary foreign exchange to import the industrial materials and equipments and wish to step up the pace of industrialization. Hence the oil price is more significantly affected by the production and pricing policies of the OPEC members with high percapita income like Saudi Arabia, Kuwait, Union of Arab Emirates, Qatar. For these two reasons the policies of diversifying the sources of supply must aim at keeping a proper balance among these three types of oil suppliers: non-OPEC countries, poor and large OPEC countries and rich and small OPEC countries.

The third is that the so-called Majors are playing a very significant role in explorations, crude oil supply, refinery and distribution. The share has declined sharply as Table 6 shows. As a result, Majors have decreased the supply to the companies not affiliated with them. In emergency, Majors may adapt their own distribution policies which may or may not coincide with the national policies of their home countries. At the time of the second oil crisis, they seem to have behaved as Table 7 demonstrates.

Table 6 : Major's Interest share in OPEC Crude Oil Production

(, 000 B/D, %)

	1970		1975		1978	
1 BP	3,868	16,5	833	3,1	400	1,3
2 Shell	2,913	12,4	1,303	4,8	351	1,1
3 Exxon	3,909	16,7	1,995	7,3	1,161	3,7
4 Mobil	1,223	5,2	516	1,9	504	1,7
5 Saucal	1,882	8,0	1,274	4,7	1,306	4,6
6 Texaco	1,981	8,5	1,407	5,2	1,435	4,8
7 Gulf	2,256	9,6	676	2,5	118	0,4
8 CFP	1,108	4,7	447	1,6	327	1,1
Sub-Total	19,140	81,7	8,451	27,5	5,611	18,8
Others	3,736	16,0	2,045	6,7	1,691	5,7
Oil Co.	22,876	97,7	10,496	34,2	7,302	24,5
Total						
OPEC, Gov.	538	2,3	16,659	61.3	22,503	75,5
Total	23,414	100,0	27,155	100,0	29,805	100,0

Source: OPEC statistics

Clearly the internal disposal became dominant, and the share of Majors in the total supply to the free world declined from 67% in 1974 to 46% in 1979. But it is still nearly half so that its importance should not be underestimated.

Table 7: Changes in Major Supply Capacities (,000 B/D)

	1974			1979		
	Crude Oil Supply	Intern'l Disp'l	Outside Sales	Crude Oil Supply	Inter'l Disp'l	Outside Sales
BP	4,440	2,100	2,270*	3,015	2,000	733
Shell	5,917	4,873	891	4,259	4,242	17
Gulf	2,700	1,957	749	1,970	1,765	230
Exxon	6,367	5,138	1,189	4,453	4,427	26
Mobil	2,462	2,060	402	1,967	2,049	
Texaco	4,507	3,060	1,447*	3,422	2,788	634
Saucal	3,815	2,134	1,462	3,272	2,205	1,070
Total	30,208	21,361	8,375	(22,361)	19,476	(2,710)
		(0,71)	(0,28)		(0.87)	(0.12)
Majors' share	0.67			0.46		

(Source) : Middle Eastern Economy, Feb. 1980

- (1) Outside sales are estimated as the same as crude oil supply minus internal disposal, except that those with * are actual.
- (2) The internal disposal in 79 and 78 are assumed equal.
- (3) The figures of BO's crude oil supply and the outside poles are estimated on the basis of those in (source).
- (4) The crude oil supply by Majors include the crude oil obtained with the proper right plus the one repurchased from OPEC and the oil obtained in the US.

In view of this trend, Japanese government is trying to increase, as it should, the percentage of DD and GG oil dealings and decrease the share of Majors from 72% in 1972 down to far less than half. Already Japanese Shosha (trading companies) and other foreign independents are playing the roles that the sales departments of Majors used to perform. One of criterions that the Majors may adopt in allocating the crude oil in emergency seems to allot each subsidiary with due consideration of their share of capital in each corporation. Since the capital share in Japanese subsidiaries is 50%, they may encounter severer restrictions at the time of disruptions. Nevertheless, it is considered wise to keep as friendly relations with Majors as possible and not to compete unnecessarily by establishing Japanese Majors, because they are still keeping good terms with most OPEC countries and will do so also in the future. Moreover, the high price of oil has brought them an enormous amount of profit, which must be invested in further explorations of oil fields wherever possible or development of oil substitutes. Thus their importance as suppliers of liquid fuels is very unlikely to decrease much further. It has been recognized, therefore, that the best policies are to maintain the friendly competition with them.

The fourth is that the marginal market called the spot market plays a significant role in adjusting the oil price quickly to the demand and supply conditions in the world. The characteristics of this market needs a careful analysis, but it will not be discussed here.

4. The Two Oil Crises in 1973-74 and 1978-79

It is well-known that the oil price at the time of Teheran Agreement in February 1973 was \$ 2.18 P/B but now after the OPEC meeting Caracas about \$ 30.- with considerable variations as is shown by Table 8. In the first oil crisis the use in oil price from January '73 to January '74 was from 2.59 to 11.65; namely, 9.06 dollars or 4.5 times.

whereas in the second oil crisis the price rise from January '79 to January '80 was from 13.34 to 30.00 dollars; namely, 16.66 dollars or 2.2 times. The multiplication ratio is less in the second crisis, but the absolute amount of increase is greater. Hence, the absolute amount dollars needed to pay the oil imports almost doubled. This is the reason why so many oil importing countries are suffering from the unfavorable balance of payment in 1980.

Table 8: The Price Increase in Main Crude Oils

	Dec. '78	Feb. '80	Δ p	<u>Feb. '80</u> <u>Dec. '78</u>
Arabian-Light	12.70	26.00	13.30	2.05
Dae-Kei	13.20	32.33	19.13	2.45
Sumatra-Light	13.55	29.50	15.95	2.18
Iranian-Light	12.81	31.00	18.19	2.42
Suetena	13.90	34.72	20.82	2.50

In the case of Japan, she imports about 5 million barrels a day, so that the annual payment for oil imports can be estimated 24.3 billion dollars for 13.33 dollars P/B, 54.8 billion dollars for 30 dollars P/B. The gap is indeed 30.5 billion dollars. Unless Japanese exports of manufactured goods can increase within reasonable time, her balance of payments must remain unfavorable for several years. In the case of the US, her recent imports are 7 million barrels per day, so that 42.59 billion dollars additional payment is necessary for the same amount of oil. Both countries must face the difficult problem of controlling the oil cost push inflation combined with the unfavorable balance of payments. This is the situation somewhat similiar to those experienced by many countries in early postwar years. The answer to overcome the difficulties is a proper combination of austerity, saving, increase in productivity, sound fiscal policy, tight money **supply**, and when necessary, foreign loans (recycling oil money). There is no easy way out, as there was not throughout the postwar years still with the vivid memories of postwar hardships, the Japanese government and people seem to have handled the oil crisis very well, particularly the second oil crisis. Table 9 compares the changes in the prices of various categories of commodities at the time of two oil crises. As the commodities are

those produced in the later stages of manufacturing their rate of inflation seems particularly less.

Table 9: Inflations After Two Oil Crisis

	1979.4~1980.3	1973.10~1974.9
Average WPI	22.8	30.6
Domestic goods	16.2	25.3
(industrial)	(16.7)	(24.7)
Export	18.3	39.0
Import	87.6	79.7
(Exchange Rate)	(3.5)	(1.3)
Crude Material	73.7	71.9
Intermediate goods	26.6	29.0
Finished goods	6.0	22.3
Cap. goods	3.1	24.7
Cons. goods	7.2	20.9
CPI	7.2	21.9

This implies that the impact of imported oil price increase has been absorbed by the labour productivity increase in almost all sectors, and the restrained rise of money wages accepted by the labor minors. One important aspect of the successful control of inflation in Japan seems to have something to do with the tight money policy in the second oil crisis to be contrasted with the policies in the first crisis. Table 10 demonstrates this fact.

Table 10: The Performance of Japanese Economy Supply, Price-Level and GDP Growth Rates (%)

	Money	Price	GDP
1973	22.7	11.7	10.0
74	11.9	24.5	-0.5
75	13.1	11.8	1.4
76	15.1	9.3	6.5
77	11.4	8.1	5.4
78	11.4	3.8	6.0
79	11.5	3.6	6.0

The contrast in two oil crises is remarkable particularly if one remembers that the disruption of oil supply in the first crisis was not so serious expost. Table 11 and 12 clearly proves that there was really no serious shortage of oil in the Japanese economy. Yet such a high inflation occurred in 1974, resulting in minus growth for the first time in postwar years. A coordinated set of economic policies can tide over the oil shocks much more smoothly than in the second oil crisis, although the unfavorable balance of payments may persist a little longer, and recycling oil money becomes a more important matter to consider now and in the future. These experiences prove that the crisis management policies must be well coordinated with ordinary economic policies.

Table 11: Supply Conditions in ME countries in the first oil crisis

	'73				'74		
	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
Saudi Arabia	100	96.2	71.0	79.7	90.6	84.8	98.0
Kuwait	100	90.0	73.1	74.6	82.4	75.0	81.6
Iraq	100	104.1	102.5	107.5	108.0	95.3	106.9
UAE	100	103.2	85.6	78.1	92.6	87.8	113.6
Qatal	100	95.4	77.6	76.2	86.6	78.0	89.5
Libia	100	109.3	78.4	81.1	93.2	80.6	86.3
Iran	100	106.7	103.7	108.3	108.8	98.8	109.3

(Source: Petroleum Economist, May 1974)

Table 12: Japanese Imports from ME countries & others

	'73				'74			(%/Sept.)
	(10 ³ Kl) Sept	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	
Saudi Arabia	(4,680)	94.7	92.8	109.0	102.5	104.8	131.7	
Kuwait	(2,332)	66.9	74.7	72.6	84.3	111.2	91.4	
Neutral Count.	(1,231)	93.6	85.3	118.0	83.5	88.1	119.5	
Iraq	(-)	-	-	(22)	(163)	(337)	(347)	
UAE	(3,001)	101.9	82.1	82.8	90.6	65.4	95.0	
Iran	(7,780)	109.1	98.5	87.8	96.1	63.9	74.1	
ME Total	(19,735)	97.5	90.3	92.9	94.0	83.0	98.1	
SEA	(4,176)	107.5	104.0	127.6	106.4	98.0	114.0	
Africa	(913)	60.8	70.8	144.2	56.7	43.7	70.2	
Total	(25,352)	97.8	91.3	99.8	93.6	83.3	99.0	

* Figures in parentheses are absolute quantities in 10³ Kl.

5. Cost-Benefit Analysis in Peace-time and Crisis

The demand structure for oil is very different between US and Japan; for instance, in 1972.

	<u>Industry</u>	<u>Transportation</u>	<u>Others</u>	<u>(%)</u>
US	39	32	29	
Japan	63	21	16	

More than half of oil consumption is gasoline and jet fuel in the US. It is utterly inconceivable to aim at self-sufficiency for Japan, but not completely unreasonable for the US. The fundamental idea behind the oil policies of the Carter administration seems to reduce the dependence on imported oil by sacrificing considerably the economic calculation. The crisis management policies can be also conceived along this line.

There is, however, another line of thinking on energy policies. Even in the US, dependence on imported oil, some observe, may not be so bad as all the protectionist policies required to reduce dependence, because they weaken the long-run efficiency of the US economy which is the real basis of American strength. Crisis management policies along this line may be rather different from the one along the first. In practice, the energy policies of the US government naturally consider the national security aspects seriously, so that the first line of thinkings will prevail. Then the premium actually paid for the sake of security must be really recognized and accepted by the American people. This agreement holds, more or less, the other European countries and Japan, where cost and benefit of economic efficiency and national security is the crucial problem in the context of oil crisis.

Needless to say, national security does not justify the unlimited or extremely large amount of premium to be paid in peace-time. Some criterion or way of thinking to determine the appropriate amount of premium for the sake of national security in view of conceivable courses of events described at the outset of this paper is the one required. Five main considerations may be mentioned here.

1. A criterion, such that it can offer the true cost of energy as a scarce resource in the 80's, including the premium for national

security and can be a basis of national calculation for consumers and suppliers, must be offered.

2. The policies to be adopted according to a certain criterion must be examined in the light of their impact on the vulnerability of the US economy at the time of oil supply disruptions.

3. The policies required to put a criterion into practice may cause the unfair distribution of income or inconvenience in living conditions. Such an aspect of social justice can or can not be compensated pecuniarily or otherwise. The Devices to mitigate the unfavorable effects in emergency seem to have an unusual importance.

4. A proposed critrion for policy recommendations must be carefully reexamined in view of its longterm implications on the restructuring of manufacturing industries and the desirable division between the public and private sectors.

5. The various policies to overcome the energy crisis must be examined from the view-point of environ mental problems. CO² problems related to coal liquefaction is a wellknown example. The most fundamental consideration is the first point. The most straight-forward application of such a criterion would be to take the market value of oil as a cost for security. If, therefor, the expenses needed to producean oil substitute equivalent to a barrel of crude oil exceeds 30 dollars, it impairs the economic efficiency of the national economy to the extent. That excess must be justified on some other grounds like those listed above from 2 to 5. Most economists accept this view even when OPEC sets the price for political reasons, so long as the price prevails in the world market. It is harder, however, how one can evaluate the benefit of security. The practical approach recommended is to examine the policies that can be done with the cost given by the prevailing import price and evaluate the benefit to be achieved. One of typical views along this line is expressed by a group of energy experts at MIT as follows:1

1. Henry D. Jakoby etal., "Energy Policiy and The Oil Problem: A Review of Current Issues," Energy Laboraty Working Paper No. MIT-EL 79-046, Sept. 1979

- a. Energy crisis management must try to achieve a good balance between economic policy objectives and political objectives.
- b. It is desirable to reduce the oil import or accelerate the reduction, but the cost of effecting the necessary policies should not exceed the world market price of imported oil.
- c. The reduction of oil import does not automatically increase the national security.
- d. Undertaking the projects of developing synthetic fuels with the cost more than the price of imported oil will lead to a waste of resources, inflation and the unsustainable industrial structure. This weakens the competitive strength of national economy and reduces the national security in the long run.

6. Typology of Oil Supply Disruptions

The so-called oil crisis seems to imply two phenomena: (1) the secular trend in adjusting the industrial and consumption structure in response to the exhaustion of oil resources; and (2) the sudden and short-lived disruptions of oil supply from major suppliers due to socio-economic or political causes. The first phenomenon seems to persist until some new energy can completely replace oil, and it is the continuous long-term trend, to which most of the foregoing arguments apply. But crisis may occur suddenly, and certain policies must be ready to meet the situations when they come. The crisis management policies in the common sense means the type of policies which are the policies only in emergency for a short period. After a while, when the conditions become normal again, the temporary policies adopted for emergency will be remedied. The crisis in this sense may be classified as from types shown in Table 13. The critical situations marked with dots lead to energy crises. How the critical conditions particularly in the Middle East affects the supply of oil depends on the regional distribution of each country's import of oil, which is shown by Table 14.

Table 13: Four Types of Crises

Economic	Social	Political	Military
1. Oil Supply Disrup.	1. Nuclear accidents	1. Economic Conflicts with US or EC	1. SU's military invasion of nearby countries
2. Food Supply Disrup.	2. Earthquake	2. Soviet Threat or Blackmail	2. China-Soviet Confrontation
3. Uranium Supply Dis.	3. Terrorism	3. Resource Supplier's Blackmail	3. Civil Wars in SEA countries
4. Intrinsic Monetary Panic	4. Pollution	4. Tension in Korean Peninsula	4. MF wars
5. Economic Blocade	5. Contagious Disease	5. Nuclear Proliferation	5. Korean War
6. Depression	6. Psychological Panic	6. Political Instability in SFA Count.	

(Source of Table 13) Japan National Research Institute, Kokusai Kankyo No Henka To Nippon No Taioo (Changes in International Situations and Japan's Response-proposals for the 21st Century), Tokyo, 1978

Table 14: OECD Countries Oil Imports (1976)

	USA	Germany	France	UK	Italy	Japan
Oil in Primary Energy	42.3	45.0	65.2	45.5	70.6	74.0
Oil Import %	42.6	94.7	99.3	88.0	98.9	99.7
Total Import 10 ⁶ MT	297.2	99.2	121.1	86.3	100.6	229.6
	Saudi Arab.	Libia	Saudi Arab.	Iran	Saudi Arab.	Saudi arab.
1	20.4	21.1	36.3	26.3	27.0	30.7
	Nigeria	Iran	Iraq	Saudi Arab	Libia	Iran
2	18.1	19.5	13.9	16.8	16.8	20.1
	Iran	Saudi Arab	Iran	Kuwait	Iraq	Indonesia
3	9.5	19.2	12.1	21.3	15.5	12.0
	Indonesia	Algeria	Abudabi	Iraq	Iran	Abudabi
4	8.9	10.6	8.3	14.9	14.4	11.1
	Libia	Nigeria	Nigeria	Katal	USSR	Kuwait
5	8.6	9.2	6.3	6.8	8.1	6.6
	Algeria	Abudabi	Algeria	OECD	Egypt	Other EE
6	7.1	7.0	3.9	5.8	3.7	4.4
	Canada	USSR	Kuwait	Other ME	Other ME	Neutral
7	6.2	3.4	3.6	5.0	3.4	4.2
	Venezuela	OECD	Libia	Nigeria	Algeria	Other ME
8	5.7	2.0	2.6	4.5	2.5	3.4
	Abudabi	Iraq	Katal	Libia	Abudabi	Iraq
9	5.5	1.8	2.4	4.3	1.6	2.9
	Trinidad	Other ME	OECD	Abudabi	Katal	China
10	1.7	1.8	2.3	4.3	1.3	2.6
Regional ME	38.0	51.5	81.3	82.0	70.2	79.3
Dependence Afr.	35.8	41.6	14.4	8.1	20	1.4
Other	26.2	6.9	4.3	9.9	8.9	19.3

(Source) IEA Oil Statistics (1976) and others.

France and Japan are most vulnerable to the disruption of oil supply from the Middle East.

These disruptions can be caused for a number of reasons listed in Table 13, but it is useful for the purpose of analysis and policy considerations to distinguish between the disruptions due to the damages of physical facilities or hardwares for oil production and shipment and those due to the malfunctioning of administrative system or softwares to control and manage the physical facilities and personnel. The former facilities include oil fields and exploratory facilities, pipe-lines, tanks, harbors, shipping facilities and lanes, refinery or liquefaction factories etc.. The latter include all kinds of administrative or institutional systems, facilities and and personnel engaged in production , transportation, export, import of petroleum and its related products. Oil crisis occurs if one or both of these systems are damaged. It is also possible, however, that with both systems properly maintained oil crisis occurs. Thus, four cases can be distinguished.

Physical facilities	maintained	damaged
Institutions		
maintained	A	C
damaged	B	D

Case A is exactly the oil crisis in 1973. They are primarily caused by the politico-economic strategies of OPEC and can be managed within some reasonable time. Case B is like the one caused by Iranian coup, and may not be manageable in a short time. Since the physical facilities are difficult to maintain without using them all the time, this case may shift to D, if the administrative system does not recover its function in time. Japanese Petro-chemical Plant in Iran is the case in point. Case C happens mainly due to some accidents. Those in the springs of 1977 and 78 are the real examples. Case D is the most catastrophic one and may lead to a major war. A careful survey of expert opinions was conducted in Japan early July, 1978. The following results are probably the most authoritative views then and are of great interest.

Question A: Will oil supply disruption occur?

	Within 2 to 3 years	Before 1990
1. Almost certainly occur	0	1
2. Very Probable	0	6
3. Probable	12	12
4. 50-50	7	6
5. Improbable	12	5
6. Very Improbable	7	2
7. Almost certainly not	0	0
	32	32

Question B: How must disruption of oil is likely to be made?

<u>Answers</u>			
1. 10 %	2	6. 60 %	3
2. 20 %	13	7. 70 %	3
3. 30 %	8	8. 80 %	0
4. 40 %	2	9. 90 %	0
5. 50 %	3	10. 100 %	<u>1</u>
			32

Question C: Which country is likely to experience a domestic instability leading to disruption of oil supply?
(% of replies)

	<u>Answer</u>
Saudi Arabia	50
Kuwait	75
UAE	34
Iraq	38
Neutral Zone	20
Indonesia	25
China	38

Clearly Iran was recognized as a most unstable country, and Chin is still considered as unstable as Iraq. Policies must be always prepared to cope with the development in each case. ¹ A critical

1. These policies are briefly discussed in NR I report, op. cit.

issue is how long the disruption will last. This was asked to experts in the same survey and the answers for Case A to D are as follows.

Question D: How long will the disruption of oil supply last in each case?

months	Case A	B	C	D
1	4	2	5	0
2	3	8	3	0
3	10	7	12	4
4	5	3	1	1
5	0	0	1	1
6	6	10	6	8
7	0	0	0	0
8	1	0	0	2
longer	<u>2</u>	<u>2</u>	<u>3</u>	<u>17</u>
	32	32	32	32

The impact of crisis may be analyzed in three aspects: 1. economic, 2. social, 3. security. It is also important to pay attention to the time pattern of crisis and the available information on the nature and degree of crisis.

The economic effects of oil supply disruption are not limited to the demand adjustment to the shortage of oil. The overall readjustment of production, employment and price-wage adjustments will be required to administer the national economy under the conditions of energy shortage. If the disruption becomes serious and elongation the economic conditions become almost like war-time.

The social effects are primarily the matter of distribution of income and sharing inconveniences mentioned as point 3. The shortage of daily necessities may cause social restlessness or confusions. If the situation becomes more serious, then it may be regarded as a matter of political security similar to the matter of national security in wartime. The crisis management policies must be contrived in accordance with the needs of the different degrees of critical situations.

The time pattern of energy crisis is unlikely to be so abrupt as the first oil crisis, and the information of critical conditions

likely to occur tends to be known beforehand, because now the communication between OPEC countries and consumers countries is far better than before. Indeed, the improvement in information alone contributes a great deal to cope with the crisis, and ignorance or uncertainty of the events to occur amplify the effects of crisis on the economy more violently through the psychological anxieties than they really do when the likely events are anticipated well.

7. A likely course of emergency and policies

In preparing the crisis management policies the most likely type of crisis and its degree of seriousness must be assumed; otherwise, any policy prescriptions will not be possible. Several authorities¹ have given their judgements which may be summarized as follows:

1. New discovery of oil fields in Alaska and North Sea cannot force the fall of oil price, because OPEC can take it into their consideration in setting the oil price and production amount.
2. Iranian production is very unstable, so that unless Saudi Arabia increases its production with some other gulf states, when necessary, the price may rise again in the near future. But it is more likely that the gulf states operate the production lines near the capacity levels and thereby keep the real price of oil fairly steady after the second oil crisis.
3. Although it is possible that some countries like Libya, Nigeria or Indonesia may take steps to raise the oil price due to the need of improving their economic conditions, the major ME countries may be more concerned with the hyperinflation going on in the U.S. and other industrialized countries so that recycling oil money may face the difficulty and not be profitably and safely reinvested. As Table 15 shows, the amount of oil money estimated by Morgan Trust and others is as much as 119.2 billion dollars at 1978's end. In addition, the oil revenue is estimated 188 billion \$ in 1979, 276 billion \$ in 1980, and oil money is

1) See Nomura Research Institute, op. cit., 1979; Walter J. Levy, Foreign Affairs, Winter, 1978/79; David A. Deese, "Energy: Economics, Politics and Security", International Security, Winter 1979/80.

Table 15: OPEC's Oil Money (100 million \$)

	1973	1977	1978
Saudi Arabia	43.4	424.0	358.0
Iran	41.0	213.0	205.0
Iraq	38.4	96.0	98.0
Venezuela	26.7	61.0	56.0
Kuwait	19.0	89.0	92.0
Nigeria	22.0	96.0	82.0
Libya	23.0	89.0	86.0
UAE	9.0	90.0	80.0
Indonesia	9.5	57.0	56.0
Algeria	9.0	43.0	50.0
Qatar	4.1	20.0	20.0
Gabon	-	6.0	5.0
Equadore	-	5.0	9.0
OPEC total	225.1	1.289.0	1.192.0
% of world trade	3.9	11.5	9.1
oil money	-	1.630.0	1.620.0

expected to go up to 214 and 304 billion \$ in 1979 and 80. Major gulf states are naturally concerned with the inflation in the US and Europe. Indeed, it may be conceivable to experience a steady decline in real terms and go up again in the latter half of the 1980's.

4. It has become recognized that too rapid industrialisation causes social disorder. OPEC will reconsider their development plan from the viewpoints of employment-creation, foreign exchange reserve, contributions to development capacities and people's education. This would probably slow down the pace of growth rate, increase the bargaining power of industrialized countries and make the OPEC policies more moderate at least from the economic point of view.
5. Industries to be developed in ME cannot obtain the international competitive capacities for several decades, so that OPEC cannot have the alternative sources of foreign exchange in the years to come. They will try to sustain the steady flow of oil supply

Hence, the industrialized countries must consider properly the justifiable interests of gulf states and, in exchange with the proper price of oil, offer a cooperation to foster the establishment of industries, their management, and training of engineers and bureaucrats. The transfer of technology must be achieved step by step.

These are the lines of likely events to take place in ME and between OPEC and OECD. The crisis management policies must be formulated, while keeping in mind these situations.

8. Crisis Management Policies

Policies to meet the needs at a time of crisis can be divided into several kinds. The first is the policies to avoid the occurrence of crisis. It aims at doing the best by all means to keep the steady flow of oil supply from any possible disruptions. Main policies are listed:

I. Avoidance of crisis:

1. strengthening the economic ties and friendly international relations with oil supplying countries,
2. promotion of D/D, G/G deals,
3. effort to stabilize the purchase and taking-back of delivered oil,
4. establishment and maintenance of friendly and steady dealings with majors,
5. cooperation with other main oil importers and cooperative bargaining with OPEC,
6. stabilization and cooperation of oil supplies among consuming countries,
7. promotion of own explorations of new fields.

The second kind is the policies to reduce the risky effects of crisis by diversifying the causes of such impacts. They are listed below:

II. Diversification of risks:

1. decrease the dependence on oil as a primary source of energy,
2. diversify the supply sources of oil,
3. diversify the sources of energy and try to obtain other energies
4. develop the domestic sources of energy,

5. try to develop more flexible systems of switching the types of energy in emergency,
6. establish the industrial structure less dependent on energy,
7. develop the energy-saving technologies.

The third is the policies to make the preparations beforehand for the possible effects of crisis. These are the policies to mitigate the impact of crisis.

III. Preparation for preserving the capacities to meet the needs in emergency

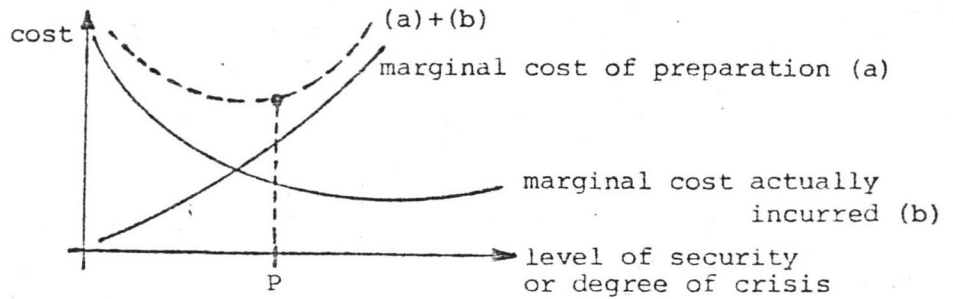
1. increase the strategic (emergency) reserves by stock-piling oil substitutes (like uranium ores for nuclear power stations),
2. participation in international cooperation system for emergency,
3. ensure the alternative sources of supply or stock-piles abroad,
4. preserve the domestic supply of oil.

When crisis comes, the unfavorable effects on GDP and its distribution are unavoidable. There are a number of ways to minimize the effects which are as follows:

IV. Minimization of effects on GDP in emergency

1. improve the capacity of obtaining information on oil market and supply conditions,
2. improve the capacity of forecasting the impacts on national economy due to supply disruption,
3. maintain the best distributive capacity for oil,
4. demand control and rationing,
5. **policies** to maintain appropriate distribution among consumers and producers,
6. socio-economic measures for maintaining income distribution undisturbed.

All these policies involve some cost which must be compared with the benefit for national security as discussed in § 5. It should also be noticed that a distinction can be made between the cost of preparation and the cost to be incurred actually when crisis come. The more preparation has been made the less the actual cost will be. The relations may be shown by the following diagram. The total cost should be minimized if the level of security, for example, expressed in terms of the time period to keep the oil supply unchanged - can be chosen to minimize the cost of crisis management at P . Beyond



this point P, the benefit of security must be greater to justify the higher cost. The marginal benefit curve may be increasing at the diminishing rate as the level of security increases, so that the net benefit may be maximized at the point of intersection of the two curves.

9. Strategic Emergency Stocks and their Problems

For a country like Japan that depends almost exclusively on imported oil, the only way to mitigate the shock of supply disruption is to reserve the strategic stocks. The Japanese government passed a law called "Petroleum Reserve Law" in April, 1976 and made it a legal duty for oil companies as a whole to stockpile the 90 days consumption equivalent of crude oil by March, 1980. This was achieved earlier and more than required. But as the rate of daily consumption increases, the amount of strategic reserves must increase also. Japan Oil Association estimates that the additional stocks needed from 1972 to 1985 are about 53.1 mill. kl. The financial burden of this stockpiling cannot be underestimated. The total cost including the expenses for land, tanks and oil itself is about 4 trillion Yen (18.2 bill. \$). This is the cost for security imposed by law, and it is annually about 1 billion \$ in 1980 price.

The effective days during which the normal economic conditions can be maintained cannot be simply calculated by an arithmetic: namely, if 50% of imported oil is cut, then 90 days stocks guarantee 180 days of normal economic conditions. There are some stocks which can never be used; the oil on the way to Japan is likely to be used oil consumption steadily increases. Assuming the unusable part as 10%, oil on tankers to Japan as 20 days worth, and the rate of increase in demand as 4,5%, the available oil for given stocks of X days worth is:

$$(1-0.1)(X+20)C,$$

where C is the daily rate of consumption in previous years. Dividing it by this year's daily consumption 1.045 C, the number of day Y for which the stocks can be avoidable is given as

$$Y = 0.9(X+20)/1.045 .$$

If the percentage of oil import reduction is a , the same Y for given a is: $Y = 0.861(X+20)/a$. Table 16 gives this Y and a for reasonable figures:

Table 16: Effects of Strategic Reserves

a \ x	90	120	150	180
10	947	1.206	1.464	1.722
20	474	603	732	861
30	316	402	488	574
40	236	301	366	431
50	189	241	293	344

Needless to say, similar tables can be calculated under several hypotheses.

In crisis, the rate of consumption may have to be reduced. But the more reserves a country has the less the reduction of consumption will be. Table 17 shows under the same hypotheses as table 16 how much reduction of consumption can be avoided if strategic reserves are 120, 150 and 180 days worth rather than 90 days.

Table 17: Avoidable Percentage in Oil Consumption

a \ x	120	150	180
10	2.2	3.5	9.5
20	4.3	7.0	9.0
30	6.4	10.6	13.5
40	8.6	14.2	18.0
50	10.8	17.8	22.5

If the economy has only 90 days worth stocks, then it must save 22.5% of consumption at a time of 50% disruption in order to consume the same amount of oil as the normal rate for 180 days. Thus it is highly desirable to study how much conservation of energy can be achieved without affecting the economic welfare, because

the cost involved in increasing stockpiles of oil is really enormous and in the case of Japan to find an appropriate space on land is very difficult.

9. The Present State of Emergency Laws in Japan

It is needless to say that any kind of government intervention into the market requires some legal bases. With no detailed explanations, these laws and their policy implications are presented here.

I. Demand side:

1. Consumption control

- a) Optimization of Petroleum Demand and Supply Law (OPDS)
(It demands to prepare various statistics but not adequate enough for large corporations)
- b) Electric Power Company Law
(Household electricity supply lines cannot be controlled)

2. Rationing of oil

- a) OPDS
(It permits rationing of petroleum and petro products. System for LPG is not appropriate)

3. Price control

- a) Emergency Policy for People's Living Law
- b) Price Control Law
(Both are the laws carried over from war-time but permits the government to set the standard price)

4. Energy saving

- a) Energy Conservation Law
(Newly passed in October 1979. The government is entitled to force the private corporations to substitute other fuels for oil)

II. Supply side:

1. Strategic reserve

- a) Petroleum Reserve Law
(no regulations to decumulate stocks in crisis)

2. Information on stocks

- a) OPDS
(information on oil demand, supply, and stocks are required.)

They are monitored well. They are not linked with international distribution or exchange)

3. Fair trade

a) OPDS

b) Law to Prohibit Cornering and not Selling

(in 1973 the law was enforced to oil companies and gas stations)

4. Development of oil substitutes

a) Law to Develop Oil Substitutes

(This is the new law to be passed in the near future and establishes a new agency called "New Energy Development Organization" and thereby promote the development of new sources of energy and synthetic fuels).