

# INDONESIAN ECONOMIC DEVELOPMENT

## ISSUES AND ANALYSIS

March 1988

Japan International Cooperation Agency

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# **INDONESIAN ECONOMIC DEVELOPMENT**

## **ISSUES AND ANALYSIS**

Edited by

Shinichi ICHIMURA

in cooperation with the team of  
quantitative study, BAPPENAS

Published by

Japan International Cooperation Agency

March 1988

国際協力事業団

18116

## PREFACE

The technical cooperation for the development of Indonesian economy was planned between Mr. Saburo Okita, ex-Minister of Foreign Affairs of Japan, and Prof. Wijoyo Nitisastro, the first Chairman of BAPPENAS, in 1968. It has been implemented by dispatching experts at the request of the Indonesian Government.

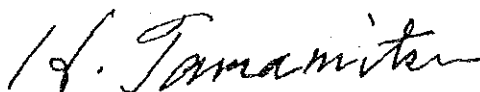
Until 1980, the cooperation had been conducted by dispatching only a few experts. However, since 1981, full technical cooperation in its quality and quantity was developed by dispatching a total of 37 experts until 1987 to support the preparation of the fourth 5-year plan, with the econometric technique under the guidance of Professor Shinichi Ichimura of Kyoto University, and to trace it. The cooperation covered project planning in various fields such as regional development, banking and financing, population, labour, and industrial development.

This publication summarized the results of the cooperation covering such various fields under the title of "INDONESIAN ECONOMIC DEVELOPMENT: Issues and Analysis" by the contributions of many participants both in Indonesia and Japan of whom Professor Shinichi Ichimura of Kyoto University requested contributions.

In 1988, the last year for planning the fifth 5-year plan, we will be happy if this publication is utilized as a material in planning by the participants, or as a material for economic analysis spanning various fields by those interested in the Indonesian economy.

We deeply thank for participation in Indonesia, including BAPPENAS, persons in Japan from the Ministry of Foreign Affairs, the Ministry of Education and the Economic Planning Agency, particularly Professor Shinichi Ichimura of Kyoto University, who made efforts in the editing of this publication, and also, all contributors from both Indonesia and Japan.

March, 1988



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Hiroaki Tamamitsu

Executive Director

Japan International Cooperation Agency

## Preface

This is the last draft of our preliminary report on Indonesian Economic Development: Issues and Analysis. We have been engaged in the applications of econometric macro-models to the Indonesian economic conditions in cooperations with the Indonesian economists mainly but not exclusively at BAPPENAS since 1980. In order to understand the issues of Indonesian economy, however, our effort has extended to many related areas beyond the macro-modeling works, as other problem areas have appeared important to us. This report is a summary of such studies of ours for the past eight years and is offered now to share them with all those here and abroad who are concerned with the process of Indonesian economic development.

Taking this opportunity, I personally wish to express my hearty gratitude for the kind help of many Indonesian and Japanese friends. Since 1969 when I visited Indonesia as the director of the Center for Southeast Asian Studies, Kyoto University for the first time, I have been engaged in many research works in Indonesia. They include: a socio-economic survey of South Sumatra Province, a project of constructing the first tentative Input-Output Table for Indonesia, a socio-economic survey of the behaviors of Javanese villagers to compare them with those of Thai villagers, a survey of the influence of non-governmental factors on entrepreneurial behaviors around Jakarta and macro-econometric modeling for the Indonesian economy. This project of preparing a report on Indonesian economic development is the latest one as of now. I realize how little I could have done over these 18 years. Certainly I will try to continue my research works in Indonesia, but I feel that I have reached a certain summing-up point. In the future I would like to reconsider the whole matter of Indonesian development from the wider point of view. For these reasons my gratitude goes not only to those who have directly participated in this project but also those who have helped me do the above-mentioned works for the past years.

In particular, however, I cannot miss the chance of thanking the following persons, among many friends in Indonesia, to whom I owe so much in completing this work: Prof. Widjojo Nitisastro, Prof. J. B. Sumarlin, Dr. Arifin Siregar, Dr. Adrianus Mooy, Dr. Soedradjad Djiwandono, Dr. Dono Iskandar, Dr. J. Tamba, Dr. Has Tampubolon and Mr. Sugito. Without their constant help and cooperation, this report will never have been completed and see the light in Indonesia and abroad. I wish to express my thanks to all of them. Lastly, I would like to thank for the lasting support of Japanese International Cooperation Agency and its staff. Their constant encouragement and generous support to this project made it possible to complete this report in three years.

Jakarta, January 23, 1988

Shinichi Ichimura



## Acknowledgment

This report was prepared with the essential assistance of the staff of BAPPENAS (National Economic Development Planning Agency) of Indonesian Government, where many of Japanese authors had the opportunities of working as technical experts with the assistance of Japanese International cooperation Agency at the request of Indonesian government. Many reports are based on their works then.

The earlier versions of some chapters were published in the following journals and the permit given to the present editor to republish them is acknowledged with gratitude: first to The Southeast Asian Studies of Kyoto University for Chapter 2 (S. Kuribayashi), Chapter 6 (Y. Kaneko, H. Tampubolon), Chapter 8 (S. Odano, Syahiril Sabilin and Soedradjad Djiwandono), Chapter 11 (Boediono, H. Muta) and Chapter 17 (Thee Kian-wee and K. Yoshihara); second to Asian Economic Journal of East Asian Economic Association for Chapter 7 (S. Odano and Dono Iskandar), and Chapter 10 (Payaman and Y. Torii).



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CHAPTER I  
AN OVERVIEW OF INDONESIAN ECONOMIC DEVELOPMENT

Shin'ichi Ichimura  
The Center for Southeast Asian Studies,  
Kyoto University, Japan

with the assistance of  
Adrianus Mooy  
Governor, Bank of Indonesia  
former, Deputy, Monetary and Fiscal Affairs, BAPPENAS

and

Soedradjad Djiwandono  
Junior Minister, Ministry of Trade  
former, Bureau Chief, Monetary and Fiscal Affairs, BAPPENAS

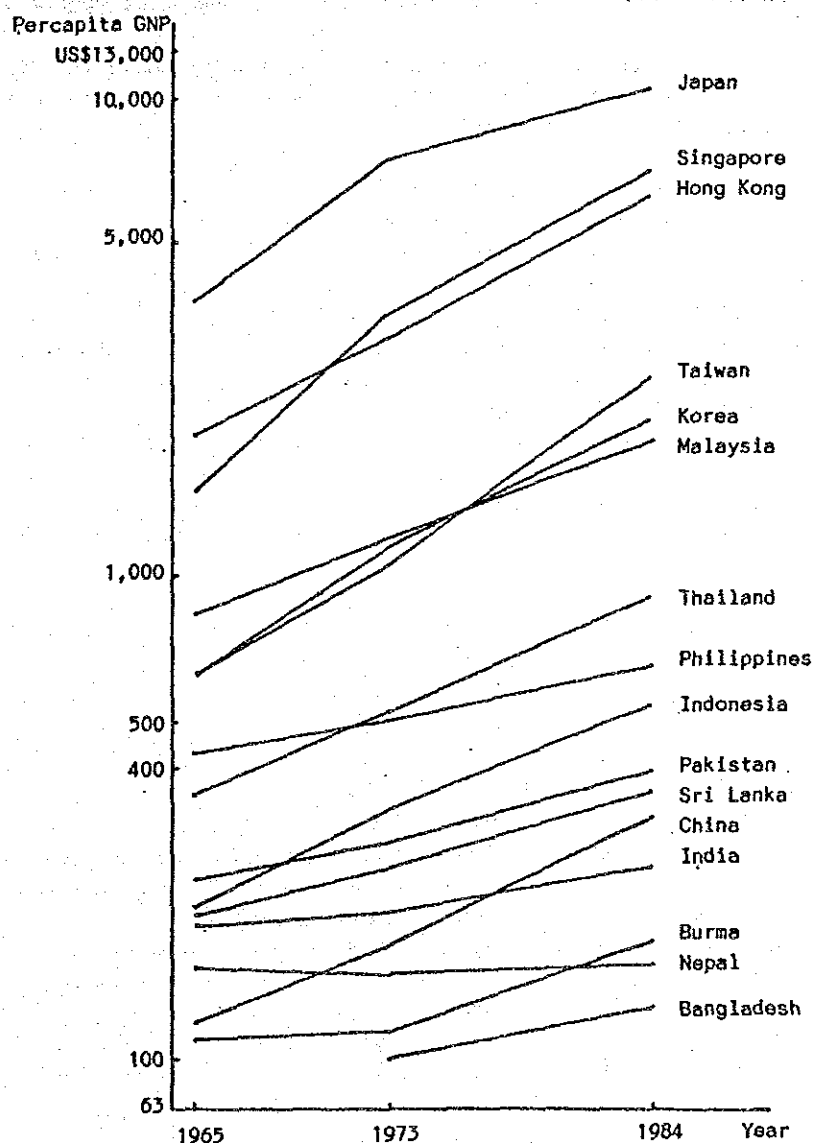


## I. GREAT DEVELOPMENT ACHIEVEMENT

In 1965 Indonesian per capita GNP was Rp. 221,000 or US\$ 205 (1 US\$ = 1076Rp.), and it was not much above the South Asian countries and slightly below the level of Sri Lanka. Indeed the average annual rate of growth of Indonesian GNP was only 3.0 % during the period of the 60's. Since the rate of growth of population in the same period was 2.0 %, per capita GNP increased only by 1 % per year. This slow growth was primarily due to the social confusion and inflation in the beginning half of the 60's.

It developed from that level in 1965 to Rp. 581,000 or US\$ 540 in 1984 in terms of 1984 prices and exchange rate. This means the annual average rate of growth of 5.2 % over the period of 19 years. This is really an impressive achievement and proves that the Indonesian economy passed the initial stage of take-off, as detailed arguments will be presented later. The overall picture of the growth performance in per capita GDP compared with other Asian countries looks like the following Figure 1:

Figure 1 Performance of Asian Economic Development for 1965 - 1984



Soon after 1965 the development of Indonesian economy accelerated, over-coming the socio-economic crises in the early 60's and thanks to two oil bonanzas in 1973-74 and 78-79. An extra foreign exchange earnings from the export of oil at higher prices may be estimated as about 4.1 billions US dollars annually in 1973-74, which is equal to the increased price: \$11 - \$2 times the annual amount of oil export; 450 million barrels per year and similarly about 10 billions US\$ in 1978 and 79. Indeed, the level of oil and gas export increased by US\$ 4.3 billion from 1972 to 74 and US\$ 9.8 billion from 1978 to 80. The annual rate of increase from the annual amount of \$ 10 billions to the annual amount of \$ 24 billion was 18% of about \$ 76 billions of Indonesian GDP in 1980. The success of Indonesian development is to a great extent attributable to the effective use of these extra incomes for the purpose of economic development in addition to the rest of development efforts of all Indonesians in the private and public sectors.

The great achievements of Indonesian economy can be observed in several crucial aspects.

1. Agriculture achieved self-sufficiency in food. This is clearly seen by the fact that the import of rice became almost zero in 1986 to be compared with the import of one or two millions ton in 1983 and earlier. This was attained when the total population of Indonesia increased from 130 millions in 1968 to 170 millions in 1986 with the annual rate of increase of nearly 3 %.

2. The production of many other primary goods also increased at the very high rates of growth. This proves how rich the potentials of Indonesian primary industries and resource explorations are. The following Table 1 demonstrates this most concretely.

Table 1 Production of Main Primary Products, 1939 to 1985

	1939	1969	1980	1985	85/69
Rice (mil.ton)		12.2	20.1	26.1	2.1
Maize (mil.ton)		2.2	4.0	4.3	2.0
Casaba (mil.ton)		10.9	13.7	14.1	1.3
Soya beans		389	653	869	2.2
Peanuts (mil.ton)		267	470	527	2.0
Fish: marine		785	1,395	1,810	2.3
Fish: inland		429	454	564	1.3
Meat		309	571	686*	2.2
Eggs		58	259	345*	5.9
Milk (mil.l)		29	78	178*	6.1
Rubber	198	778	1,021	1,026	1.3
Palm oil	244	189	701	1,159	6.1
Coffee	58	175	285	324	1.9
Tea	83	62	106	134	2.2
Pepper		17	38	46	2.7
Tobacco		84	116	119	1.4
Sugar		992	1,831	3,156	3.2
Cotton	1,576	3	6	70	23.3
Teak (000 m3)		520	500	450*	.86
Timber ( " )		7,587	25,130	15,957	2.1
Sawn wood ( " )		177	1,793	2,119	11.9

Note: \* refers to 1984; units not mentioned are thousand tons.



In most of these items the Indonesian economy approximately doubled their production from 1969 to 1985. These are the second source of Indonesian economic development only next to oil price bonanza.

3. Industrial development is beginning to take the shape of initial modernization beyond the development of agro-industries or the industries based on natural resources such as food or oil processing industries. Some basic manufacturing industries have been built up over the decade of 70's and the early 80's, so that when the government devalued Rupiah against Yen and Dollars in 1983 and 87, the non-oil exports could respond to the decline of the terms of trade. This is most clearly seen by the following increasing complexity of the structure in Indonesian manufacturing industries.

Table 2 The Structure Of Manufacturing Industries in 1974-84 (in billion Rps.)

Industry	74	79	84
31 Agro-industry	743 (45.0)	2400 (40.1)	4682 (33.1)
32 Textiles & shoes	272 (16.5)	794 (13.3)	1823 (12.9)
33 Plywood	84 ( 5.1)	366 ( 6.1)	1097 ( 7.8)
34 Paper	34 ( 2.1)	138 ( 2.3)	311 ( 2.2)
35 Chemicals & fertilizers	227 (13.7)	913 (15.3)	2469 (17.5)
36 Cement & glass wares	58 ( 3.5)	290 ( 4.8)	633 ( 4.5)
37 Iron, steel & basic metals	19 ( 1.2)	215 ( 3.6)	986 ( 7.0)
38 Machinery	189 (11.4)	774 (12.9)	2102 (15.0)
39 Other manuf.	25 ( 1.5)	86 ( 1.4)	63 ( .4)
	1652 (100.00)	5979 (100.00)	14,148 (100.00)

Table 2 shows in terms of gross output that the manufacturing industries have been slowly but steadily developing in Indonesia, and they are gradually shifting to the higher stage of manufacturing industries. In comparison with the nearby countries' economies, however, Indonesia is still behind so that the future course of Indonesian economic development requires more rapid industrialization. Table 3 shows in terms of industrial components of GDP the shifting composition of industries reflecting the higher degree of industrialization in recent nine years.

Table 3 Sectoral Distribution in Percentages; Constant 1983 Prices

	1978	1979	1980	1981	1982	1983	1984	1985	1986
Agriculture	24.7	24.8	24.6	24.0	24.3	24.0	23.9	24.0	23.9
-food crops	14.4	14.3	14.5	14.9	15.0	15.0	15.2	14.9	14.7
-non-food crops	2.5	2.7	2.8	2.8	2.8	3.1	3.0	3.2	3.3
-estate crops	0.8	0.8	0.7	0.7	0.8	0.5	0.6	0.6	0.6
-livestock	2.1	2.3	2.4	2.3	2.4	2.4	2.4	2.5	2.5
-forestry	3.2	3.0	2.6	1.8	1.6	1.3	1.2	1.1	1.0
-fishery	1.7	1.7	1.7	1.6	1.6	1.7	1.6	1.7	1.7
Mining	28.1	26.0	24.1	22.8	19.4	19.0	18.9	17.5	17.7
-oil/natural gas	27.4	25.2	23.3	22.0	18.6	18.1	18.2	16.7	16.9
-other	0.8	0.8	0.8	0.8	0.9	0.8	0.7	0.8	0.8
Manufacturing	8.8	9.6	11.0	11.0	11.2	11.1	12.1	13.2	13.5
-oil refining	0.3	0.3	0.3	0.2	0.2	0.2	0.3	0.8	1.1
-LNG	1.2	2.0	2.5	2.4	2.5	2.5	3.4	3.7	3.5
-other	7.3	7.4	8.2	8.4	8.5	8.4	8.4	8.8	8.9
Electricity	0.4	0.4	0.5	0.5	0.6	0.7	0.7	0.7	0.8
Construction	5.0	5.3	5.8	6.1	6.2	6.2	5.7	5.6	5.5
Trade, hotels	14.1	14.5	15.2	15.3	16.5	16.3	15.7	15.5	15.4
-trade	11.8	12.2	12.9	13.2	14.3	14.1	13.5	13.3	13.3
-hotels	2.3	2.2	2.2	2.1	2.2	2.2	2.2	2.2	2.1
Transport/communication	4.3	4.3	4.4	4.6	5.0	5.4	5.5	5.6	5.5
-transport	4.1	4.1	4.1	4.3	4.6	5.0	5.1	5.0	4.9
-communication	0.2	0.3	0.3	0.3	0.4	0.4	0.4	0.6	0.6
Finance	1.9	2.2	1.9	2.7	2.9	2.8	3.1	3.0	3.1
Ownership dwellings	2.5	2.5	2.5	2.5	2.6	2.7	2.6	2.7	2.7
Public administration	5.8	6.1	6.2	6.5	7.4	7.7	7.7	8.1	8.0
Other services	4.3	4.2	4.0	3.9	4.0	4.1	4.0	4.0	4.0
GDP	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

4. The infra-structure has also been constructed adequately to match the stage of Indonesian economic development. At the level of per capita GDP US\$ 500 the infrastructures around major population centers like Jakarta, Surabaya, Bandung and Medan are fairly adequate and improving at least at the pace not seriously to hinder the further economic growth. Table 4 shows how fast the main urban centers are linked by roads, railroads and airline services and other tertiary service facilities have been prepared.

Table 4 Construction of Main Infra-Structure

		1971	1980	1986
Road	000km	89	143	220e
(paved	"	23	57	86e)
Cars	000		791*	987('85)
Buses	"		134*	231('85)
Trucks	"		657*	845('85)
Motor cycles	"		3764*	4765('85)
Locomotives			679	798('84)
Passenger coaches			1113	834('84)
Aircrafts			762*	788('84)
M.T.O.W.	mill.lb.		29.6*	29.6('84)
Ships, ocean	000 DWT		667	833('84)
Ships, interinsular	"		392	501
Post office			2838	4019e
Telephone sets	000 sets		669*	763e
Tourists	000		598*	776e
Hotels			4263*	5278e
Sanitary water	mill. m3		412*	531e
Electricity	mill MWH		11.4*	18.6e

Note: \* means that the relevant years are 1982.

e: estimated.

5. Indonesia had to start its development after independence with insufficient number of educated personnel, but this has been remedied with enormous effort by the government to improve the education system in the country. This is demonstrated by the following statistics in Table 5.

6. Despite the occasional social unrest, the New Order regime has managed to keep Indonesian political economy stable and offered the business community the favorable circumstances in which private and public enterprises can concentrate their development effort without worrying the political instability or risks. This is very different from the conditions in most Latin American countries or even some Asian countries. What is directly relevant to the economic development is, however, the economic policies of the government: The direction of guidance given to the Indonesian economy and the choice of policies by the New Order regime was admirable, and they can be seen from the past four Five Year Development Plans (REPELITA). This will be briefly discussed in the next section.

Table 5 Improvement of Educational System in Indonesia

	1971	1980	1985
Population of 7-12 schooling age (million)		22.3	24.7
		10.0	11.2
		9.3	10.4
Population attending school (million)			
7-12	9.7	18.1 (81%)	21.0 (85%)*
13-15	2.5	5.8 (58%)	7.1 (63%)
16-18	.9	2.8 (2%)	3.6 (35%)
19-24	.3	1.6	2.0
Primary schools		129*	140
teachers		926*	1037
pupils (thousand)		25,804*	26,550
High schools		18*	23
teachers		391*	489
pupils (thousand)		6,593*	7,776
Universities*			478*
state univ.		41	
teachers (thousand)		36	
students ( " )		196	
Students			
state univ. (thousand)			360*
priv. univ. (thousand)			447*
Government budget for education, culture & youth (billion Rps.)		786 (12.3%)	1,511 (14.2%)

Note: \* means it refers to 1983/84.

## II. DEVELOPMENT PLANS AND THE PERFORMANCE OF INDONESIAN ECONOMIC DEVELOPMENT

The past four Repelita may be summarized by the following Table 6. In each stage of Indonesian economic development, the government Five Year Plan gave an appropriate guidance to macro-economic policies and indicated the direction of industrialization of Indonesian industries. In particular, the very principles of balanced budget was the most fundamental that completely separated the policies of the New Order government from the earlier Sukarno regime. This was made possible by the close cooperation of the military regime in power with the technocratic economists team who had the basic training of modern economics. International cooperation to form IGGI was also essential, because it permitted the Indonesian government to start its new stabilization policies immediately as soon as it came out of the social chaos of Coup d'etat in 1965.

Indonesian development plans have always had several fundamental problems to tackle with on the basis of national principles for development, Pancasila: Fairness, Growth and Stability.

- 1) It must offer the employment opportunities for rapidly increasing labor force at the annual rate of about 3%.
- 2) It must raise the standard of living of the rapidly increasing population whose aspirations are ever expanding.
- 3) It must industrialize the Indonesian economy because it can not rely on the oil and gas sector alone for ever.
- 4) Indonesia must build up the infra-structure for industrialization.
- 5) It must emphasize the investment in human capital.
- 6) It must realize a fair distribution of the development benefits among different regions and different social groups.

On the last point, the President always emphasized to adapt the following eight passages to materialize them:

1. to secure the food, clothing and housing for the mass,
2. equal opportunities for education and medical care,
3. fair distribution of income,
4. equal opportunities for employment,
5. equal opportunities for economic activities,
6. equal opportunities for participation,
7. to dissolve the regional differentials,
8. to keep fairness in all opportunities .

It is by no means easy to realize 100 percent these objectives, but the government has been trying hard to incorporate such ideals in the past Five Year Plans and to a great extent realized. In recent years, however, the falling prices of oil and gas made it very difficult for the government to continue the same effort at the same pace, so that more and more emphasis has been placed on efficiency, the role of private enterprises and more mobilization of domestic resources and savings.

Table 6 A Summary of Four Five Year Development Plans, 1969 to 1989

	Repelita I 69/70-73/74	Repelita II 74/75-78/79	Repelita III 79/80-83/84	Repelita IV 84/85-88/89
GDP/capita	\$ 270	\$ 388	\$ 495	\$ 540
A. Central problems & policy guidance	Urgent stabilization of living conditions of the nation. 1. Agricultural develop. and increase of food prod. 2. Development of agro-ind. 3. Control of inflation 4. Development of textile ind.	Consolidating the base for economic devel. & balanced growth 1. Satisfying necessities 2. Building up infra-struct. 3. Egaritarian income distr. & welfare 4. More employment opportun. 5. Development	Development and equal distribution of its fruits 1. Realizing development 2. Sound & dynamic society 3. Non-oil/gas export promot. 4. Labor-intens. industries & good firms 5. Food self-sufficiency	Solidifying the basis of self-sustained and fair growth 1. Freeing from heavy reliance on oil/gas 2. Non-oil/gas export promot. 3. Increase non-oil gov. revenue by tax & monetary reform 4. More employment opportun.

	5. Building up of infra-str.	of resource processing ind.	6. Strengthening private sector	5. Develop. of manufacturers
Growth target	5.0 %	7.5 %	6.5 %	5.0 %
Actual perform.	7.7 %	6.9 %	6.1 %	(3.0 %)
B. Main trends	<ol style="list-style-type: none"> <li>Expansion of resource explorations</li> <li>Success of controlling inflation</li> <li>Increase in capital inflow</li> </ol>	<ol style="list-style-type: none"> <li>High prices for oil &amp; gas</li> <li>Slow foreign capital inflow</li> <li>Domestic pro. of fertilizer &amp; cement etc.</li> <li>Favorable BOP</li> </ol>	<ol style="list-style-type: none"> <li>BOP turning unfavorable</li> <li>Continued good crops of rice &amp; food self-suffic.</li> <li>Development of manuf. ind.</li> </ol>	<ol style="list-style-type: none"> <li>Continuous oil price decline</li> <li>Tax reform to increase non-oil gov. revenue</li> <li>Rupiah devalu.</li> <li>Agricultural development</li> </ol>
C. Policies toward foreign capital	<ol style="list-style-type: none"> <li>Open doors to foreign capital in selected ind.</li> <li>Promoting import-substit. industries</li> <li>Emphasizing industries with quick returns</li> </ol>	<ol style="list-style-type: none"> <li>Preferential permit for foreign capital</li> <li>Indonesianization of ind. &amp; technology</li> <li>Decentralization &amp; regional devel.</li> </ol>	<ol style="list-style-type: none"> <li>Posit. list for FDI</li> <li>JV with project aid</li> <li>Guiding industrial pol.</li> <li>Promot. of small &amp; medi. pribumi firms</li> </ol>	<ol style="list-style-type: none"> <li>Less restrictions on JV for export industr.</li> <li>More generous permit for JV with cooperatives (20%)</li> <li>Liberalization of state banking</li> </ol>
D. Socio-political events & policies	<ol style="list-style-type: none"> <li>IGGI formed (1966)</li> <li>Freezing relations with China (67)</li> <li>West Irian issue solved (69)</li> <li>First Oil Shock (Oct. 73)</li> </ol>	<ol style="list-style-type: none"> <li>Tanaka riot (Jan. 74)</li> <li>Pertamina crisis (75)</li> <li>End of Vietnam War (75)</li> <li>Second Oil Shock (Oct. 78)</li> <li>Rupiah devaluat. (Nov. 78)</li> <li>Iran revol. (Jan. 79)</li> <li>Vietnam's invas. of Cambodia (Dec. 79)</li> </ol>	<ol style="list-style-type: none"> <li>SU's invas. Afghanistan (Dec. 79)</li> <li>Oil glut &amp; oil price fall (81)</li> <li>Counter-purchase policy</li> <li>Devaluation of rupiah (March 83)</li> </ol>	<ol style="list-style-type: none"> <li>Further fall of oil price due to unsuccessful OPEC control</li> <li>Sharp increase of debt and debt service</li> <li>World debt crisis</li> <li>Marcos crisis (Feb. 86)</li> <li>Confinement decision for Andi and Darsono (86)</li> </ol>

The present Fourth Five Year Plan stated its fundamental targets as follows:

Population growth rate:	2 %
GDP growth rate:	5 %
New labor force:	9.3 millions
The rate of inflation:	8 %
Gross capital formation:	145.2245 trillion Rp.
Gross cap. form. growth rate:	19.1 %

This implies that Indonesian Incremental Capital Output Ratio for this period is  $19.1/5.0 = 3.8$ . It may be examined whether under the new circumstances of falling oil prices, this condition can be satisfied. This macroscopic balance of Investment-Saving will be examined in the following section.

### III. INVESTMENT, SAVINGS AND ICOR IN INDONESIA

Indonesia enjoyed the low Incremental Capital Output Ratio in comparison with other countries. This is not surprising because it could save capital by relying on the past explorations of oil wells. But sudden decline of oil prices made it impossible to maintain the nominal amount of oil exports so that the balance of payments became much less favorable and finally unfavorable. The following Table 7 shows the dramatic change in recent years.

Table 7 Trends of Exports and Imports: 1953 to 1986 (mil. US\$)

Year	Foreign Trade Incl. Oil & Gas			Foreign Trade Excl. Oil & Gas		
	Exports	Imports	Balance	Exports	Imports	Balance
1953	840.2	764.7	75.5	635.6	712.2	-76.6
60	840.8	577.7	263.1	620.0	551.9	68.1
65	707.7	694.7	13.0	435.7	682.1	-246.4
70	1108.1	1001.5	106.6	661.8	986.8	-325.0
72	1777.7	1561.7	216.0	864.6	1531.4	-666.8
73	3210.8	2729.1	481.7	1602.1	2685.3	-1083.2
74	7426.3	3841.9	3584.4	2214.9	3658.9	-1444.0
78	11643.2	6690.4	4952.8	3657.8	6110.4	-2452.6
79	15590.1	7202.3	8387.8	5426.4	6408.8	-982.4
80	23950.4	10834.4	13116.0	6168.8	9085.9	-2917.1
81	25164.5	13272.1	11892.4	4501.3	11550.4	-7049.1
84	21887.8	13882.1	8005.7	5869.7	11185.3	-5316.5
85	18586.7	10261.9	8324.8	5868.8	8987.5	-3118.7

The export boom in terms of US dollars was at its peak in 1981. It began to decrease thereafter. In terms of Rupiah, however, the peak was in 1984 because of the devaluation of Rupiah vis-a-vis US dollars. As a share in GDP in current prices the peak was in 1980: 33.0 % and steadily declined to 20.8 % in 1986. In the same year the balance of payments turned unfavorable. The decline of world oil price was so dramatic to fall from above \$30 to as low as \$11 and is remaining around \$15.5 now.

This decline of exports caused the decline of investment almost by necessity, first by forcing the government to cut down the government capital formation to avoid the serious fiscal deficit, and second, by influencing indirectly the capital formation in the private sector which depends on government investment pretty much in Indonesia. As the result the capital formation to GDP ratios in Indonesia which has steadily risen from 15.3% in 1976 to 26.3% in 1982 began to decrease thereafter. The growth rate of Indonesian economy seems to have shown a negative rate of growth in 1982 for the first time. The significant change in the value of the rate of capi-

tal accumulation, growth rate and ICOR seems to have occurred after 1982. This can be seen by the following Table 8.

Table 8 Capital Accumulation, Growth Rate and ICOR

Year	Inv./GDP	Growth rate	ICOR
76	15.3	8.2	1.9
77	16.9	7.0	2.4
78	19.4	2.2	8.8 > 3.8
79	20.1	5.5	3.5
80	23.3	8.7	2.7
81	24.7	7.1	3.4
82	26.3	-0.3(5.3)*	(5.0)
83	25.7	3.4	7.6
84	24.3	6.1	4.0  > 6.5
85	21.0	2.2	9.5
86	20.5	3.2	6.4

\*(5.3) is calculated as an average of 7.1 and 3.4.

Clearly the ICOR in Indonesia increased very significantly after 1982. Even if we consider the existence of excess capacity in various sectors in Indonesia so that the potential growth rate may be higher than the one in Table 8 after 1982, still one should accept the increase of ICOR of Indonesian economy from now on. 6.5 may be a little too high, but say, 5.5 may be the one to expect in the coming decade or so. This implies that if the rate of capital accumulation is 21%, then the rate of growth in GDP will be about 3.8% at the high degree of capacity utilization. An important information is then that unless the capital formation to GDP ratio increases above 21%, Indonesian rate of growth in GDP is very unlikely to exceed 4%. This is true independently of the increase of oil and gas price. Higher energy prices contribute to the rate of growth by raising the capital formation to GDP ratio.

On the other hand, savings mobilization has been rather impressive. The rate of saving was very high throughout the 70's. The following Table 9, however, shows that the situations changed in the late 70's and especially after 1982. Notations in Table 9 are as follows.

CPR: Real Private Consumption	XR: Real Exports
CGR: Real Government Consumption	MR: Real Imports
SAV: Gross Savings	JR: Real Inventory Investment
GDPR: Real Gross Domestic Product	and Statistical Discrepancies
INV: Gross Investment	

It is clear that the rate of savings in Indonesia was very high until 1977. It began to decline in 1978 and sharply fell in 1982. As Table 8 showed, 1978 was a recession year in which the rate of growth in GDP dropped from 7% in the previous year to 2.2%, and that 1982 was also a recession year in which the rate of growth was -0.3%. This gives an important proposition for the Indonesian economy; namely, if the rate of growth slows down, the rate of saving tends to go down.

On the other hand, the Indonesian rate of saving far exceeded the rate of domestic capital formation. This enormous gap was fulfilled by investment abroad. Indonesia must permit the transfer of large sum of payments abroad to service the debt and foreign corporations' transmission of profits. But at the same time the large amount of capital outflow of one form or



another must have taken place in the 70's. There was, however, a dramatic change in the early 80's when the oil prices began to fall. The balance of trade became unfavorable; the investment abroad became much less; the growth rate of GDP became low; so that the gap between the domestic savings and domestic investment became also very small. Since the transfer payments out of Indonesia were still significant, it had to borrow more and rely heavily on the foreign loans in the early 80's.

Table 9 Savings and Investment

(%)

Year	CPR/GDPR	CGR/GDPR	SAV/GDPR	(XR-MR)/GDPR	JR/GDPR	INV/GDPR
71	54.6	5.9	39.5	22.5	1.2	15.9
72	50.3	5.8	43.9	26.9	1.3	15.7
73	49.5	5.0	45.5	29.0	1.2	15.2
74	51.1	5.2	43.7	27.4	1.0	15.3
75	49.7	8.0	42.3	26.0	1.0	15.3
76	49.6	7.7	42.7	26.0	1.3	15.3
77	48.4	7.9	43.7	25.3	1.5	16.9
78	51.4	8.8	39.6	20.7	-0.4	19.4
79	52.9	9.3	37.8	18.3	-0.7	20.1
80	54.0	10.3	35.7	16.9	-4.6	23.3
81	55.5	10.6	33.9	2.2	7.1	24.7
82	59.1	11.5	29.3	-0.9	3.9	26.3
83	60.7	11.0	28.3	-1.0	3.7	25.7
84	59.8	10.8	29.4	4.0	2.4	24.3
85	60.1	11.2	28.7	2.4	5.2	21.0
86	60.2	10.9	28.9	5.4	2.9	20.5

#### IV. THE OIL AND GAS SECTOR AND INDUSTRIALIZATION IN INDONESIA

Indonesia is an important member of OPEC and plays an important role in the world oil market, but the relative importance of oil/gas sector in the Indonesian economy should not be exaggerated. As Table 10 below shows, it can hardly live on this sector. Even including the refining activities of oil and production of LNG, the oil and gas sector occupies only about 15% of Indonesian GDP in the current prices in 1986.

It is clear that the oil/gas sector including the processing activities can no longer be a leading sector in the Indonesian economy because it occupies only 14.7% of GDP in 1986. This is a dramatic decline from about 24% in 1980 and 81. Unless the oil/gas prices quickly recover, the share is very unlikely go back to that high level again. In fact, in constant prices non-oil/gas manufacturing industries have grown at the annual rate of growth of 7.1%, when the growth rate of GDPR is 4.5%. Compare these figures with the growth rate of agriculture about 4% and that of oil/gas including refining and LNG about 0.6% in constant prices. Thus, development strategies from now on must be placed on industrialization. At the same time, however, it must be remembered that the shortage of capital in the sense of domestic savings and foreign exchange earnings is expected for a coming decade so that the optimal allocation of scarce capital is critical for the development strategies.

Table 10 Sectoral Composition of Indonesian GDP in Current Prices, 1978 to 86

Sector	78	79	80	81	82	83	84	85	86
Agriculture	28.1	27.3	24.0	23.4	23.9	24.0	23.6	23.7	25.8
Mining	17.8	20.0	23.0	22.6	19.4	19.0	18.3	16.3	11.1
-oil/gas	17.0	19.0	21.7	21.7	18.6	18.1	17.6	15.6	10.4
-other	0.8	0.9	1.3	0.9	0.8	0.8	0.7	0.7	0.8
Manufacturing	11.7	11.7	13.0	12.1	11.9	11.1	12.9	13.5	14.4
-refining oil	0.5	0.3	0.2	0.3	0.2	0.2	1.0	1.6	1.9
-LNG	0.8	1.7	2.5	2.2	2.6	2.5	3.1	2.7	2.4
-other manuf.	10.4	9.7	10.3	9.6	9.1	8.4	8.9	9.1	10.1
Electricity	0.5	0.4	0.5	0.5	0.5	0.7	0.7	0.8	0.9
Construction	5.7	5.7	5.3	6.0	6.0	6.2	5.5	5.6	5.4
Trade, hotels	13.8	14.6	15.0	15.3	16.2	16.3	16.0	15.4	16.7
Trans. & Comm.	5.1	4.9	4.5	4.1	5.0	5.4	5.7	6.5	6.6
Finance	2.0	2.3	1.9	2.7	2.8	2.8	3.1	3.0	3.4
Owner dwelling	2.9	2.8	2.5	2.6	2.8	2.7	2.6	2.6	2.7
Public administ.	7.4	6.1	6.6	7.2	7.5	7.7	7.4	8.4	8.6
Other services	4.9	4.3	3.8	3.6	3.7	4.1	4.2	4.2	4.3
GDP	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

What kinds of manufacturing industries are to be developed? Fundamentally the development strategies to be chosen are to allow the private initiatives in developing any industries, because they are always very conscious of cost minimizing which leads to efficiency in production and optimum allocation of scarce resources -- capital, skilled workers and engineers. Public enterprises are notorious everywhere in the world in their inefficiency and excessive reliance on public funds and protected monopolistic positions.

At the same time, however, some guidance by the government is useful. The so-called industrial policy may be useful in Indonesia as well. For this purpose some experimental calculation may be made under different hypotheses what kinds of industries are likely to develop themselves, if technological conditions are not too different from the present ones prevailing in Indonesia, say, in 1985. Such calculations have been found useful in many countries including Japan. One useful but tentative calculation has been offered by a Japanese team of experts at the Ministry of Industry in Indonesia, relying on the Input-Output table. As a sort of guidance its "medium case" is presented herewith. The medium case means that the medium rate of growth is assumed for exports and that the medium degree of import-substitution is assumed. The detailed explanation may be found in a report by Eiichi Yanagi, January 1988.

Table 11 Forecasts of Domestic Products

(Unit: Percent of 1985 Value)

	1985(=100)	1989	1990	1991	1992	1993
1 Paddy	100.00	115.13	119.53	123.91	128.29	132.74
2 Other food crops	100.00	118.75	123.60	128.41	133.28	138.21
3 Other agricultural crops	100.00	116.64	122.05	127.65	133.48	139.59
4 Livestock & its products	100.00	110.33	113.97	117.57	121.21	124.91
5 Forestry	100.00	119.84	126.52	133.74	140.58	148.00
6 Fishery	100.00	123.34	129.17	135.02	141.03	147.18
7 Coal & metal ore mining	100.00	108.61	112.58	116.86	120.72	124.88
8 Crude oil & natural gas	100.00	112.94	115.59	114.62	113.65	112.72
9 Other mining & quarrying	100.00	118.62	124.83	131.62	136.94	142.82
10 Canned & preserved meat	100.00	138.67	147.53	156.53	165.79	175.37
11 Dairy product	100.00	126.22	132.71	139.19	145.78	152.46
12 Processed & preserved vegetables	100.00	141.29	151.46	162.09	173.31	185.14
13 Processed & preserved fish	100.00	126.80	132.96	139.06	145.24	151.49
14 Vegetable & animal oil	100.00	128.22	136.00	144.14	152.70	161.74
15 Milled cereal	100.00	121.69	127.10	132.46	137.86	143.32
16 Flour	100.00	121.33	126.95	132.61	138.33	144.22
17 Bread & bakery product	100.00	118.58	123.44	128.24	133.06	137.95
18 Noodle, macaroni & Similar Products	100.00	119.65	124.64	129.58	134.56	139.60
19 Sugar refinery	100.00	117.61	122.35	127.07	131.93	136.83
20 Cocoa & sugar confectionary	100.00	114.91	119.83	124.75	129.73	134.82
21 Ground coffee	100.00	93.89	95.18	96.47	97.77	99.10
22 Processed tea	100.00	118.85	123.71	128.52	133.37	138.28
23 Processed soybean	100.00	115.58	119.97	124.31	128.68	133.12
24 Other food products	100.00	114.89	119.23	123.53	127.88	132.30
25 Alcoholic beverage	100.00	113.17	117.60	121.97	126.32	130.75
26 Nonalcoholic beverage	100.00	115.60	120.27	124.94	129.65	134.52
27 Cigarette	100.00	117.85	122.57	127.24	131.96	136.74
28 Spinning	100.00	129.18	137.28	145.78	154.65	164.04
29 Weaving	100.00	137.81	147.91	158.48	169.65	181.56
30 Made-up textile goods	100.00	128.49	136.51	144.60	152.76	161.25
31 Knitting	100.00	162.37	178.16	195.04	213.27	232.90
32 Wearing apparel	100.00	134.49	144.77	155.71	167.53	180.35
33 Carpets, rugs, ropes & others	100.00	153.97	169.79	186.86	204.47	223.38
34 Tanned & finished leathers	100.00	96.68	98.53	100.39	102.53	104.74
35 Footwear & leather product	100.00	106.14	109.29	112.44	115.67	118.98
36 Sawmills, planing & other processing	100.00	152.83	168.05	184.90	201.67	220.21
37 Wood & cork product	100.00	120.40	126.57	132.98	139.52	146.42
38 Furniture & fixture	100.00	118.09	123.25	129.03	133.98	139.13
39 Pulp, paper & cardboard	100.00	122.80	129.82	137.24	144.45	152.19
40 Paper & cardboard product	100.00	135.67	146.15	156.98	167.61	178.69
41 Printed & published material	100.00	112.58	116.77	120.97	125.05	129.27
42 Fertilizer & pesticide	100.00	126.61	134.16	142.05	150.36	159.19
43 Basic chemicals	100.00	120.97	127.73	134.74	141.88	149.58
44 Paint & lacquer	100.00	114.10	119.65	125.71	130.21	135.28
45 Medicine	100.00	118.13	122.87	127.54	132.26	137.05
46 Cleaning material & cosmetics	100.00	120.27	125.36	130.45	135.58	140.81
47 Other chemicals	100.00	118.83	125.11	131.67	138.15	145.13
48 Oil refinery & its product	100.00	124.50	128.53	127.95	127.27	126.68
49 Coal product	100.00	115.88	121.01	126.50	131.44	136.76

50 Tyre & tube	100.00	102.47	105.44	108.42	111.34	114.46
51 Other rubber product	100.00	104.00	107.32	110.74	113.67	116.88
52 Plastic ware	100.00	114.37	119.05	123.85	128.30	132.95
53 Ceramics & earthenware	100.00	111.60	116.46	121.88	125.85	130.26
54 Glass & glassware	100.00	113.25	118.33	123.92	128.21	132.93
55 Structural clay & ceramic product	100.00	115.93	121.91	128.71	133.34	138.59
56 Other nonmetallic mineral product	100.00	115.13	120.91	127.47	131.99	137.10
57 Cement & limestone	100.00	120.50	127.66	135.74	142.07	149.17
58 Basic iron & steel	100.00	115.33	121.28	127.94	132.92	138.54
59 Nonferrous basic metal	100.00	119.73	125.63	131.87	138.10	144.71
60 Cutlery & agricultural tool	100.00	115.63	121.03	127.03	131.68	136.77
61 Metallic furniture & fixture	100.00	104.63	107.69	110.93	113.77	116.77
62 Structural metal product	100.00	115.77	121.72	128.49	133.09	138.32
63 Other metal products	100.00	115.57	121.41	127.87	132.87	138.46
64 Non-electrical machinery & apparatus	100.00	96.65	101.80	106.81	109.16	113.22
65 Electrical machinery & apparatus	100.00	109.31	116.56	123.53	127.72	133.78
66 Communication equipment & apparatus	100.00	116.99	123.06	129.65	135.63	142.14
67 Household electrical appliances	100.00	127.41	134.22	141.32	147.53	154.11
68 Accumulator & dry battery	100.00	100.79	103.25	105.76	108.08	110.51
69 Other electrical appliances	100.00	109.93	114.83	120.06	123.88	128.31
70 Ships, its repair & maintenance	100.00	120.01	127.13	135.29	140.69	146.97
71 Train, its repair & maintenance	100.00	122.62	129.80	137.93	143.69	150.19
72 Motor vehicle, motor cycle & other	100.00	107.77	112.04	116.34	119.87	123.83
73 Aircraft, its repair & maintenance	100.00	110.27	115.33	120.87	124.70	129.15
74 Professional, scientific equipment	100.00	142.24	155.68	170.50	186.25	203.63
75 Photographpic & optical goods	100.00	124.40	132.02	140.31	146.92	154.30
76 Jewelry articles	100.00	116.77	121.40	126.08	130.88	135.80
77 Musical instrument	100.00	127.46	140.90	155.14	166.54	179.52
78 Sporting goods	100.00	115.34	119.88	124.46	128.83	133.35
79 Other manufacturing industries	100.00	111.77	115.95	120.14	124.27	128.58
80 Electricity, gas & water supply	100.00	113.06	117.49	121.87	126.01	130.36
81 Construction	100.00	116.79	122.93	129.93	134.68	140.09
82 Trade	100.00	117.04	122.54	128.06	133.15	138.66
83 Restaurant & hotel	100.00	117.94	122.81	127.56	132.24	137.04
84 Transport & Communication	100.00	117.25	122.45	127.73	132.77	138.88
85 Financing, real estate	100.00	116.85	121.66	126.27	130.70	135.31
86 Public & other services	100.00	99.61	101.76	103.81	105.85	107.95
<hr/>						
Total manufacturing	100.00	120.08	125.80	130.96	135.81	141.04
Total industry	100.00	115.43	120.13	124.31	128.14	132.23
<hr/>						

The industries which exceed the national average rate of industrial growth can be found by looking through Table 11. The restructuring of industries is expected to take place at the steady rate from old industries to new ones like food processing, textiles and apparels, or electrical home appliances.

A list of industries expected to grow fast may be offered here: 1985 to 1993

1. Industries expected to grow  
faster than 6% per year

Canning and preserving meat  
Canning and preserving vegetables  
Vegetable and animal oil  
Spinning  
Textile products  
Knitting goods  
Apparel  
Carpets & others  
Sawmills & other processing  
Pulp, paper & cardboard  
Paper & paper products  
Profess. & scientif. equip.  
Fertilizer & pesticide  
Basic chemicals  
Sporting goods  
Other chemicals  
Glass  
Basic iron & steel  
Cutlery Hand Tools  
Structural metal products  
Other Fabricated metal products  
Non-electrical machinery  
Industrial electrical machinery  
Radio & television  
Home electrical appliances  
Other electrical apparatus  
Ships: repair & maintenance  
Trains: repair & maintenance  
Vehicles  
Proff. & scient. measuring equip.  
Photographic & optical goods  
Musical instruments

2. Industries expected to grow  
faster than 4% per year

Non-paddy crops  
Forestry  
Fishery  
Mining  
Dairy products  
Processing & preserving fish  
Milled cereal  
Flour  
Bread & bakery products  
Noodles & similar products  
Sugar refinery  
Cocoa & chocolate  
Wood & cork products  
Furniture & fixture  
Paint & varnish  
Medicines  
Cleaning materials & cosmetics  
Other Petroleum & Coal Products  
Other Rubber Products  
Plastic Ware  
Clay & ceramic product  
Other non-metallic min. prod.  
Cement & lime stone  
Non-ferrous basic metal  
Other metal products  
Electricity, gas & water supply  
Construction  
Trade  
Hotels & restaurants  
Transportation & communication  
Financing & business services

Although the importance of oil/gas sector has declined, its crucial role in providing the government sector with an easy way of collecting the revenue must be kept in mind. First, the proportion of oil-related revenues in the total government revenue can be seen from Table 12 below.

Table 12 Government Revenue and Expenditure (billion Rp.)

	1984	1985	1986	1987	1988
Total govern. rev.	16193	17060	16413	19648	22468
:growth rate(%)		5.4	-3.8	19.7	14.4
Oil/LNG revenue	11637	10289	7611	9724	11329
:share to total	(71.9%)	(60.3)	(46.4)	(49.5)	(50.4)
Non-oil direct tax	2004	3339	3159	3688	4449
Non-oil indirect tax	2551	3431	5642	6234	6690
:growth rate (%)		(48.6)	(30.0)	(1.4)	(24.8)
Oil price (\$/b)	27.918	26.240	13.638	17.40*	17.0*
				(15.5)	

Note: \* oil prices are the prices assumed in the budget. The prevailing price in 1987 was about \$ 15.5 p.b. In 1988, it may be below \$ 17 p.b.

From this table the elasticity of oil revenue to oil price change can be estimated as an approximation. By taking the simple arithmetic mean of three year-to-year elasticities observable from 1984 to 1987, it is 1.48. Therefore, if the oil prices increase from \$ 15.5 to \$17 in 1988, it is about 9.68% increase so that the government oil revenue will increase by 14.33%; namely, the estimated government oil revenue on this basis will be 11,117 bill. Rp., which is approximately equal to the government budget presented now. In other words, one dollar increase in oil price will bring in about 930 billion Rp. Since even now the oil/LNG revenue occupies about half of government revenue, it is critical how much increase of oil/gas prices can be expected for the coming five years. Since the world economy is experiencing the volatile movement and facing uncertainty in many unexpected events, the government should be prepared to be cautious in holding too optimistic views about the future oil prices and try to promote non-oil export-oriented industries.

In order to compensate the decreasing trends in the non-oil/LNG revenue, the Indonesian government has reformed the taxation system and tried to increase the non-oil/LNG tax revenue. It is not clear, however, whether the increases observed in 1984 and 85 can continue or not. The elasticity of non-oil/LNG tax with respect to the increased incomes in manufacturing industries can be calculated from Table 12. It shows a very high elasticity in the first two years, but it includes the initial effect which cannot be repeated. The effect in 1986 is very low. The experiences in most industrialized countries show that such elasticity is around 1.0. The elasticity in 1985-86 is 0.59, which is too low. With more effort for effective collection of tax on the part of government officials, the government revenue must be increased. Otherwise, the non-oil/LNG revenue assumed in the 1988/89 budget may turn out to be too optimistic.

#### V. DEVELOPMENT STRATEGIES AND DEBT MANAGEMENT

The Indonesian government faces not only the difficulty of obtaining the necessary revenue to match the development plans in the near future mainly due to the falling oil/gas prices but also the need of servicing the accumulated public debt which has matured for repayment. The proportion of the annual budget allocated to external debt repayment is steadily increasing.

Table 15 External Public Debt of The Republic of Indonesia (million \$)

End of year	Disbursed and outstanding		Undisbursed at each
	pre-1966	post-1966	year's end
1980	1,975.9	11,018.3	9,307.7
81	1,736.1	12,209.1	10,524.2
82	1,589.8	15,177.4	11,873.7
83	1,415.9	18,536.6	12,543.3
84	1,279.4	20,309.7	13,668.1
85	1,314.9	23,887.2	14,053.9
86	1,419.9	30,101.6	15,778.5
87/6	1,464.6	33,170.6	15,350.9

The Indonesian debt consists of the following kinds as of June 30, 1987:

Table 16 Indonesian Outstanding Debt, June 30, 1987

	<u>disbursed</u>	<u>undisbursed</u>
a: Multilateral creditors.....	6,270.2	6,100.5
b: Bilateral creditors .....	11,716.2	4,309.5
c: Export creditors .....	9,670.5	2,743.7
d: Commercial creditors .....	6,978.3	2,197.2
Total	34,635.2	15,350.9

\*Data are taken from tentative files compiled by Bappenas Quantitative Study Team.

The actual burden of debt may be heavier than the amount mentioned here, because the foreign currency, particularly Yen, debt was converted to US dollars at the exchange rates prevailing at the end of each year but Yen has been revalued significantly after June 30, 1987. It is estimated that about 40% of Indonesian debt is Yen-denominated, so that with the current trends of Yen revaluation and serious Rupiah devaluation Indonesian debt situation is only next to the Philippines in Asia. An extremely careful debt management is required in Indonesia. This means that speculation on devaluation of Rupiah must be very seriously cautioned, so that the cooperation of fiscal and monetary policies on the financial side is critical for the development strategies for the next Five Year Plan period.

Table 13 Government Budget and Debt Repayment

	84	85	86	87	88
Internal Gov. Rev.	16,193	17,060	16,413	17,236.1	21,803.0
External Debt Repay.	2,668	2,448	4,398	6,765.4	10,608.0
: share (%)	(16.5)	(14.3)	(26.8)	(39.3)	(48.7)

Note: The figures for 87 and 88 are taken from the draft budgets.

According to the official draft budget to be submitted to the parliament, the external debt repayment is nearly half of the internal government revenue. Moreover, the amount of repayment in the coming years are expected to increase very rapidly. Some estimates say:

Table 14 Estimated Public Debt Servicing Requirements (million US\$, %)

Year	Government Debt			State Enterprise			Sum
	Repayment	Interest	Total	Repayment	Interest	Total	
87	2,576	2,316	4,892	225	96	321	5,213
88	46.9	10.9	29.8	7.1	-14.6	0.6	0.6
89	13.5	-4.1	6.4	-4.6	-26.8	-1.0	-1.0
90	2.3	-9.4	-2.6	-17.4	-21.7	-18.3	-18.3
91	-1.0	-2.0	-4.7	-37.4	-51.1	-40.0	-40.0

\*Data are taken from tentative files compiled by Bappenas Quantitative Study Team.

This poses a serious problem in preparing the government budget for the year 1989 and thereafter in two ways. First, the surplus left for domestic routine and development budget will become too small to cover even the minimum requirements. It implies that the government has no alternative but to rely on the external aid called Development Revenue from IGGI and others. They are classified as program aid and project aid. This amount must increase very significantly so that the public debt of the Republic of Indonesia around 34.6 billion dollars now will have to increase. Second, the effective policy to devalue Rupiah against US dollars or Japanese Yen will become less effective and cause a new difficulty of repayment, because in terms of Rupiah the amount of payment will increase. If, for instance, half of the government revenue originates in terms of dollars and half of the government expenditure is repayment in terms of dollars, then Rupiah revaluation gives no benefit to the budget. Of course, it certainly has the effects on exports, imports and others. The government has to think twice before appealing to devaluation which may be attractive to promote non-oil/gas exports and increase the government Rupiah revenue.



CHAPTER II  
A MEDIUM-TERM MACROECONOMETRIC MODEL FOR ECONOMIC PLANNING\*

Sei Kuribayashi  
Economic Research Institute,  
Economic Planning Agency, Japan

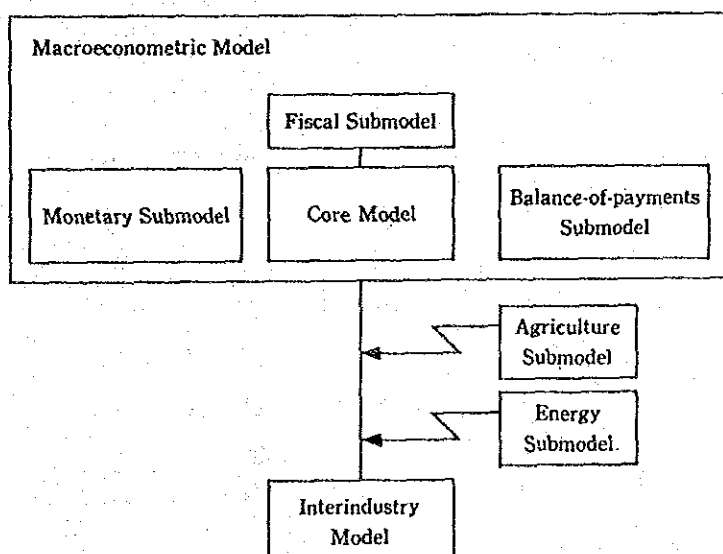


## I. INTRODUCTION

The five-year development plan which the Indonesian Government works out every five years is indicative by nature, setting policy guidelines for government development policies. Three development plans have already been formulated and carried out since 1969, and implementation of the Fourth Five-year Development Plan (Repelita IV) began in April, 1983. In Repelita IV, macroeconomic models were employed in order to obtain consistency in macroeconomic aggregates in the economic framework of the plan. The plan states: "Repelita IV has attempted to employ macroeconomic models as guidance for its broad quantitative estimates. This has enabled the plan to take a better account of the existing interdependencies and interrelations among variables as well as among sectors, with a view to obtaining a better consistency in the planned macroeconomic aggregates. In this respect the present plan constitutes a step forward from the past practice."

The macroeconomic models consist of a macroeconometric model, an interindustry model and two submodels, agriculture and energy, as described in Fig. 1. The macroeconometric model comprises a core model, a fiscal submodel, a monetary submodel and a balance-of-payments submodel. The core model and each submodel were constructed and tested independently at the first stage, then at the later stage attempts were made to integrate them. The monetary submodel, however, was not connected with other models because of our shortage of computer capacity. Consequently, the macroeconometric model, which consists of the core model, the fiscal submodel and the balance-of-payments submodel, was used for the purpose of conducting simulations for Repelita IV. The balance of payments submodel, however, was not completely integrated with the core model and the fiscal submodel, but rather used for checking purposes, for it did not have feedback loop to influence the other models, and exchange rate treated as an exogenous variable in the macroeconometric model.

Fig. 1 Macroeconomic Model for Economic Planning in Indonesia



The core model was estimated several times with data for different sample periods. It was first estimated with the data for the sample period 1969 to 1980. Then data for 1981 were added, and it was re-estimated and revised to give Core Model-81. Core Model-81 was used for

planning together with other submodels. It was then re-estimated with the data from 1969 to 1983 to give Core Model-83. Other submodels were treated similarly, and numerical suffixes are added to distinguish the different versions and revisions with different sample periods.

This paper aims mainly to describe the structure of the core model and to explain its structural equations. Section 2 describes the historical development of the Indonesian economy in the 1970s and 1980s in terms of macroeconomic aggregates. Section 3 explains the structure of the core model.<sup>2)</sup> In section 4 multiplier analysis is briefly presented.

## II. ECONOMIC DEVELOPMENT IN INDONESIA

### 1. Economic Development since 1969

It goes without saying that a necessary condition for model builders is to have a good grip of the characteristics of economic development in the past and of problems and issues of the present and future. First, therefore, a brief description is given of the economic development of Indonesia since 1969 in terms of macroeconomic aggregates.

Indonesia's per capita gross domestic product (GDP) was less than 100 dollars in 1970, about 200 dollars in 1974 and hit the 300 dollar mark in 1977. Indonesia became one of the lower middle-income economies in the World Bank's classification, attaining a per capita GDP of about 490 dollars in 1980.<sup>3)</sup> GDP increased at an annual rate of about 20 percent in the 11 years from 1970 through 1981, due to a large extent to big increases in the price of the crude oil that Indonesia exported.

Table 1 Comparison with ASEAN Countries

	GNP per capita (dollars) (1982)	Population (millions) (mid-1982)	Average Annual Rate of Growth (%) (1970-1982)	Average Annual Rate of Inflation (%) (1970-1982)	Percentage of Labor Force in: (1980)		
					Primary Industry	Secondary Industry <sup>2)</sup>	Tertiary Industry
Indonesia	580	152.6	7.7	19.9	58	12	30
Thailand	790	48.5	7.1	9.7	76	9	15
Philippines	820	50.7	6.0	12.8	46	17	37
Malaysia	1,860	14.5	7.7	7.2	50	16	34
Singapore	5,910	2.5	8.5	5.4	2	39	59
Korea, Rep. of	1,910	39.3	8.6	19.3	34	29	37
Hong Kong	5,340	5.2	9.9	8.6	3	57	40
Industrial Market Economies	11,070	722.9 <sup>1)</sup>	2.8	9.9	6	38	56
Japan	10,080	118.4	4.6	6.9	12	39	49
United States	13,160	231.5	2.7	7.3	2	32	66

Sources: World Bank, *World Development Report 1984*.

Notes: 1) This figure shows total population of industrial market economies.

The average population is 38.0.

2) Secondary industry comprises mining, manufacturing, construction and electricity, water, and gas.

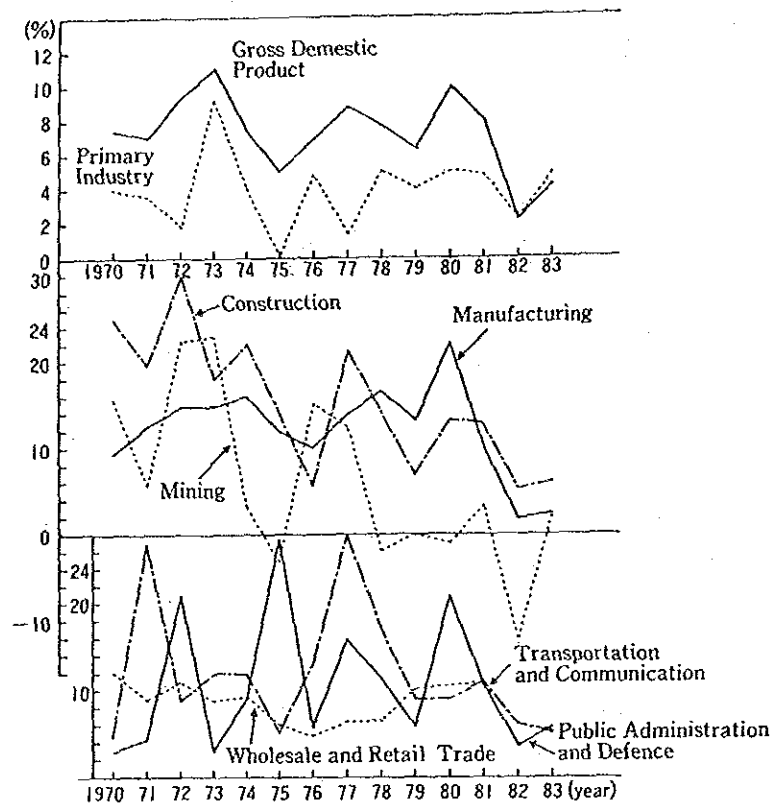
In comparison with ASEAN countries other than Brunei, Indonesia had the largest population and the lowest GDP per capita in 1982 (Table 1). In the World Bank's classification, Indonesia, Thailand and the Philippines belong to the lower middle-income economies, while Malaysia and Singapore belong to the upper middle-income economies. Indonesia performed as well as other ASEAN countries in terms of the rate of growth of real GDP between 1970 and 1982, but had the highest rate of inflation, 19.9 percent. In the industrial structure of employment, Indonesia has high percentage distribution in primary industry and low one in secondary industry.

Table 2 shows changes in the percentage distribution of real GDP by industrial origin. It is clear that the percentage primary industry (mainly agriculture) decreased rapidly while those of manufacturing, construction, transportation and communication, and public administration and defense increased. Mining, and wholesale and retail trade maintained roughly a constant percentage distribution throughout the decade. Fig. 2, which depicts changes in annual growth rates of real GDP by industrial origin, reveals certain interesting features. First, real GDP follows a conspicuous growth-rate cycle with two-year cycle with two-year down-swing. Second, as can be guessed from Table 2, growth rates of GDP and primary industry change almost in parallel except for 1977. Up to about 1976, in particular, the growth patterns of mainly agriculture and mining were reflected in GDP. Third, the influences on GDP of manufacturing, construction, and public administration and defense have increased since 1977, though agriculture and mining were still dominant. Fourth, the real growth rate of all industries dropped sharply in 1982, and most industries except agriculture recorded the lowest rate of growth were also very low in 1983. In building a macroeconomic model, it is extremely important to assess whether this sharp reduction in the rate of growth of real GDP is of a temporary nature or more permanent.

Table 2 Percentage Distribution of Real GDP by Industrial Origin

	1970	1975	1980	1983
1. Primary Industries	45.4	36.8	30.7	29.9
2. Mining and Quarrying	10.1	10.9	9.3	7.4
3. Manufacturing	8.4	11.1	15.3	15.6
4. Electricity, Gas and Water Supply	0.4	0.5	0.7	0.9
5. Construction	2.8	4.8	5.7	6.3
6. Wholesale and Retail Trade	16.3	17.0	16.6	17.4
7. Transport and Communication	3.2	4.0	5.5	5.9
8. Banking and Other financial Intermediaries	0.9	1.3	1.9	2.2
9. Ownership of Dwelling	1.7	2.6	3.0	3.1
10. Public Administration and Defense	6.0	7.4	8.7	9.2
11. Services	4.7	3.6	2.8	2.6
12. Gross Domestic	100.0	100.0	100.0	100.0

Fig. 2 Growth Rate of GDP by Industrial Origin



To find out why the growth rate of real GDP dropped suddenly at the beginning of the 1980s, we also have to examine GDP by expenditure. Fig. 3, which depicts growth rates of real GDP by expenditure, also reveals a few important facts. First, the rate of increase in private final consumption fluctuates almost in parallel with the growth rate of real GDP, but the former far exceeds the latter in 1974 and in the period 1979 to 1981. This phenomenon may only be observed in oil-exporting countries. This is attributable to two big increases in the price of exported crude oil. As Indonesia is an oil-exporting country, the so-called "oil shock" for oil importing countries turned out to be an "oil bonanza" for Indonesia. Income was transferred from oil importing private consumption to increase at a much higher rate than GDP. This is shown more clearly in Fig. 4, which shows annual movement of the terms of trade of Indonesia. The terms of trade substantially improved in 1974 and in the period 1979 to 1981.<sup>4)</sup> That is to say, Indonesia became able to import three or four times as many goods and services as before the increases in the crude oil price with the same amount of exports in those years. We can also notice that imports increased substantially in the same years. At the same time, imports fluctuated almost in parallel with private consumption. Second, the rate of increase in exports decreased after 1976 and real exports even decreased after 1979. It was due to sharp increases in the export price of crude oil that the Indonesian economy was able to maintain a high growth rate in the late 1970s, despite the deceleration of real exports.

Fig. 3 Growth Rate of GDP by Expenditure

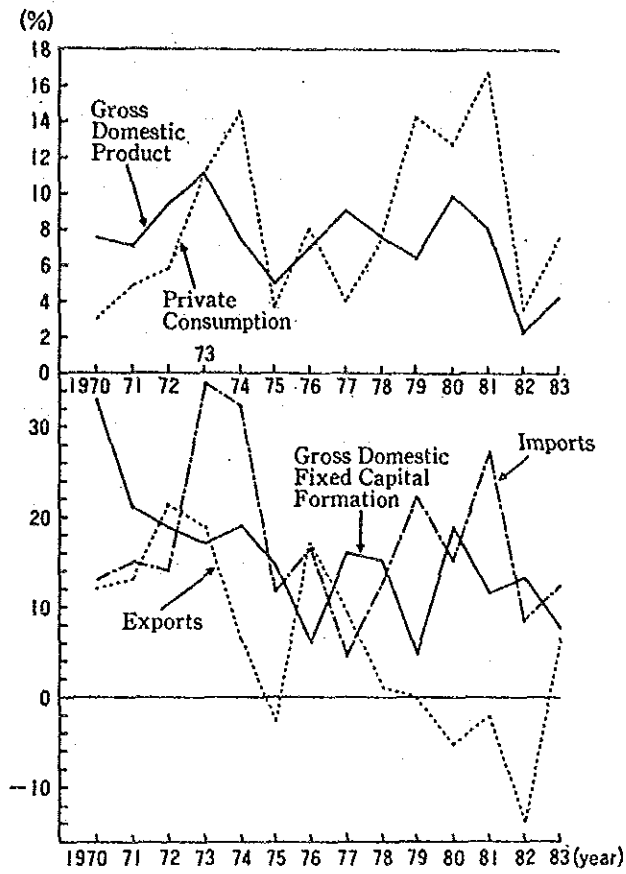
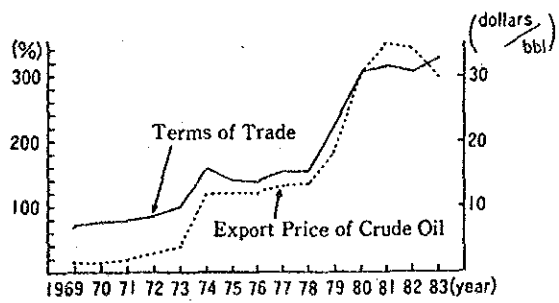


Fig. 4 Terms of Trade and Export Price of Crude Oil



The sharp drop in the growth rate of real GDP in 1982 was caused mainly by a steep decrease in exports, which was ascribed to the long-lasting severe world recession triggered by the second "oil shock." In 1983 non-oil exports of Indonesia increased due to the increase in world trade that accompanied the recovery of the world economy, especially the economy of the United States. The growth rate of real GDP, however, remained low, though it exceeded the rate in the previous year. This was caused by the reduction in both government consumption and investment. The export price of crude oil was reduced by five dollars per barrel in March, 1983. This affected government revenue adversely and aggravated the balance of payments. In the face of this economic difficulty, the Government restrained its expenditure severely and devalued foreign exchange. In this connection, real government consumption decreased by 1.0 percent and real government investment by 8.5 percent (Table 3).

Table 3 Annual Growth Rate of Real GDP by Expenditure

	1969-81	1982	1983	1970-73	1974-78	1979-83
1. Private Consumption	8.5	3.4	7.5	6.1	7.5	10.9
2. Government Consumption	12.3	8.2	-1.0	15.0	12.3	7.5
3. Total Investment	14.9	13.0	7.8	22.6	14.2	11.1
3.1 Private Investment	9.8	24.0	26.2	18.4	8.9	13.1
3.2 Government Investment	22.6	4.7	-8.5	39.8	23.5	10.1
4. Exports	7.5	-13.9	6.3	16.2	6.3	-3.2
(non-oil/gas Exports)	(4.4)	(-)	(-)	(-)	(-)	(-)
5. Imports	17.0	8.2	12.3	19.1	15.5	17.0
6. Gross Domestic Product	7.9	2.2	4.2	8.8*	7.2*	6.1*
				(5.0)	(6.7)	(6.5)

Note: \*The target growth rate in each five-year plan.

Table 4 Annual Growth Rate of Real GDP by Industrial Origin

	1969-81	1982	1983	1970-73	1974-78	1979-83
1. Primary Industries	3.8	2.1	4.8	4.6	3.0	4.2
1.1 Agriculture	3.9	3.6	4.8	3.1	3.4	5.5
1.2 Forestry	3.1	-24.1	3.5	20.8	0.4	-10.7
1.3 Fishery	3.6	5.5	6.2	1.1	4.3	5.6
2. Mining and Quarrying	7.5	-12.1	1.8	16.7	5.0	-1.7
3. Manufacturing Industries	14.0	1.2	2.2	13.0	13.7	9.7
4. Electricity, Gas, and Water Supply	13.4	17.4	6.9	11.7	13.5	14.8
5. Construction	16.1	5.2	6.2	23.1	15.2	8.8
6. Wholesale and Retail Trade	8.0	5.7	3.8	10.3	6.5	8.0
7. Transport and Communication	13.4	5.9	5.0	13.3	15.1	7.9
8. Banking and Other Financial Intermediaries	15.4	11.7	7.0	22.2	14.9	11.0
9. Ownership of Dwelling	14.3	5.2	6.1	15.4	15.1	6.9
10. Public Administration and Defense	11.8	3.6	5.5	7.9	13.9	9.1
11. Services	2.5	2.3	2.5	2.6	2.4	2.4
12. Gross Domestic Product	7.9	2.2	4.2	8.8	7.2	6.1



It is crucial to recognize that Indonesia's external economic environment became much less favorable in the early 1980s than in the 1970s. The five-dollar reduction in the oil export price was literally a "reverse oil shock" to Indonesia. This is one of key elements of our model building.

Table 3 and 4 show respectively the trends of real GDP by expenditure and by industrial origin. Both tables are based on the assumption that growth trends changed in the early 1980s. The last three columns in both tables show annual average growth rates for the past three five-year development plans. Observed growth rates of real GDP exceeded the targeted growth rates for Repelita I and Repelita II, but fell short of those for Repelita III because of the low growth rates in 1982 and 1983. Compared with the previous two planning periods, the average annual rates of increase in 1979-83 decreased for most items in both tables. This may mean that as the scale of the Indonesian economy increased, the economic domestic frontiers were reduced and economic development decelerated. The rates of increase in real value added of forestry and mining dropped sharply, as did the rate of increase in construction, although this still remained relatively high. On the other hand, fishery, agriculture, and electricity, gas, and water supply attained accelerating growth rates through the three periods, though the acceleration was not large.

On the expenditure side, the rate of increase in exports dropped sharply, while private consumption increased at an accelerating rate. This was attributed to the "oil bonanza."

Indonesia has given priority to agricultural development to attain self-sufficiency in food and to developing and fostering import substitution industries mainly in the field of consumption goods. One problem is that the development of import substitution industries did not necessarily lead to export promotion and Indonesia lagged far behind in developing export industries. Exports, therefore, consist mainly of crude oil and primary products. In the 1970s crude oil export brought in enough foreign currency for Indonesia to import both consumer goods and capital goods needed to pursue its development policies. After 1982, however, Indonesia encountered difficulties in earning foreign currency and had to employ austerity policies. Another important feature of the Indonesian economy is that government expenditure, both consumption and investment, increased at the highest rate in the 1970s and led the economy. This is a common feature of almost all developing countries. Since Indonesia depends on crude oil export -- about 60 percent of total export is crude oil and about 70 percent of government domestic revenues is related to oil production and export -- decreases in the export price of crude oil and the quantity of crude oil export compelled the Government to reassess its economic policies and development strategies in the early 1980s.

## 2. Economic Problems in the 1980s

We have seen that Indonesia was confronted with several economic problems in the early 1980s. These have to be taken into account in constructing a macroeconomic model. Some of them will be touched upon here.

### 2.1 Reduction of the Excessive Dependence on Petroleum and LNG

Indonesia depends on crude oil export in two aspects: to earn the foreign currency necessary for economic development, and to finance government expenditure, especially government development expenditure. Prospects for the quantity and price of crude oil export, therefore, are crucial factors in the future economic development of Indonesia. This means that the Indonesian economy is substantially influenced by the world economic conditions. Indonesia economy is substantially influenced by the world economic conditions. Indonesia, therefore, has to reduce its excessive dependence on crude oil in order to attain a stable economic growth rate, by promoting non-oil exports on one hand and on the other by changing government revenue systems so as to increase tax revenue from sources other than oil companies and by reducing subsidies on refined petroleum products.

## 2.2 How to Finance the Economic Development

Needless to say, developing countries need foreign as well as domestic capital in order to achieve adequate economic development. It is usually difficult, if not impossible, for developing countries, especially low-income economies and lower middle-income economies, to finance their economic development with only domestic saving, for their saving rates are very low. Consequently, they have to earn foreign currency either by exports or by overseas financing such as foreign aid, borrowing or direct investment, or by both.

In the 1970s Indonesia earned enough foreign currency for her rather high economic development by exporting crude oil and gas. During the same period the Indonesian Government was able gradually to reduce the ratio of foreign aid to total government revenue, while increasing the share of development expenditure in total expenditure. Indonesia was, however, confronted with difficulties in increasing crude oil export in the face of "the reverse oil shock" of the early 1980s. High priority, therefore, needs to be given to the promotion of non-oil exports in place of crude oil and gas in Repelita IV. On the other hand, one way to save foreign currency is to foster and develop import-substitution industries so as to reduce imports and improve the balance of payments. Indonesia has adopted this development strategy for consumption goods industries and obtained good results. One problem is that the development of import substitution industries did not necessarily lead to the development and promotion of export industries. Another policy measure for increasing exports and reducing imports is devaluation of the exchange rate, which has been done several times in the past. In the past, however, devaluation of the rupiah contributed to the reduction of imports but not to the promotion of exports.

Capital goods industries have not yet been developed in Indonesia, so that increases in public and private investment serve to increase imports and worsen the balance of payments, as will be shown later by multiplier analysis. It is a difficult and challenging task for policy-makers to decide what strategies should be adopted for developing capital goods industries. Different strategies from those adopted for consumption goods industries might be considered, for their impacts on others sectors will be more profound and far-reaching.

## 2.3 Creation of Employment Opportunity

It is estimated that 1.5 to 2.0 million mainly young people will enter the labor market every year in the coming years. An important task is to create jobs for this young labor force. According to the input-output table for 1980, the percentage distribution of employment among industries is as follows: primary industry, 54.1; manufacturing, 9.6; construction, 3.0; wholesale and retail trade, 12.4; transport and communication, 2.8; services and others, 16.3. It is also well known that most of the labor force is employed in small-scale or cottage industries, especially those using domestic resources. In the face of an decelerating economic growth rate, an economic and social system must be devised to make effective use of domestic resources and to absorb new entrants to the labor force.

## 2.4 Control of Inflation

Table 1 showed that the rate of inflation in Indonesia in the period 1970 to 1982 was very high compared with other countries. Indonesia has been trying to increase domestic savings by changing its financial systems. For this purpose, among others, it is crucial to control inflation in Repelita IV.

# III. MEDIUM-TERM MACROECONOMETRIC MODEL FOR ECONOMIC PLANNING

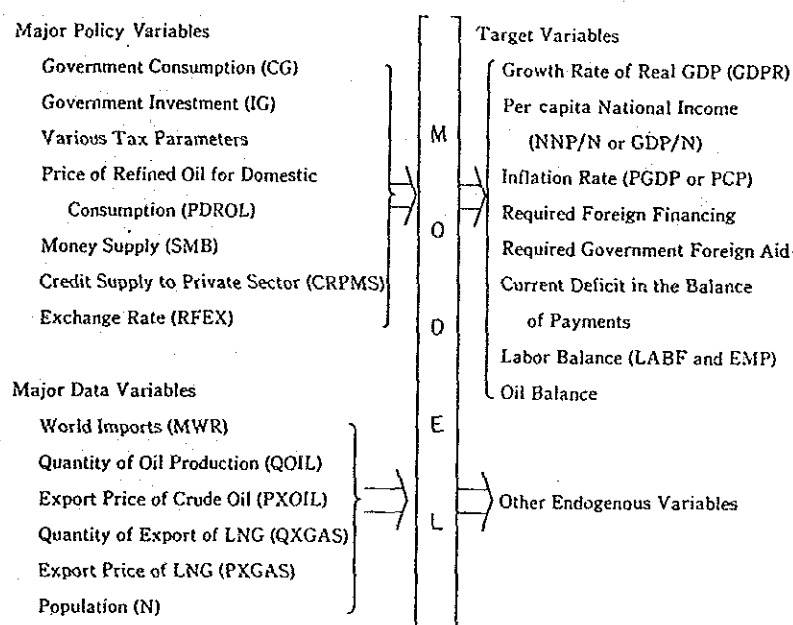
## 1. Basic Framework of Macroeconometric Models

The major role played by macroeconometric models in economic development planning is that of tracing and estimating the relationship between economic policy objectives and policy measures in the light of past economic development, and of selecting optimal policy measures for achiev-

ing the policy targets set in order to solve the problems in the economy.

Our macroeconomic models were, therefore, designed to assess quantitatively the impact of government economic policies on a variety of macroeconomic aggregates, especially target variables. As mentioned, world economic conditions influence the Indonesian economy to a large extent, so that variables representing world economic conditions also have to be incorporated into the macroeconomic models to estimate their impact on the Indonesian economy. Fig. 5 show major policy variables, data variables and target variables.

Fig. 5 Policy and Target Variables in the BAPPENAS Macroeconomic Model



Main policy variables belong to the government sector and are closely connected with the fiscal submodel. As far as the government revenue is concerned, tax parameters are considered as policy parameters. Although various tax equations were estimated for the sample periods, the parameters of tax equations may be changed so as to estimate the impact of tax reform on government revenue and other economic aggregates during the planning period. Important policy variables in our models are government consumption, which roughly corresponds to the central government's routine expenditure, and government investment, which corresponds to the central government's development expenditure less defense expenditure and subsidies on fertilizers. The Indonesian Government subsidized petroleum products in the 1970s to keep their domestic prices much lower than international market prices of their equivalents. Facing economic difficulties at the beginning of the 1980s, the Government introduced new policies to reduce the subsidies and to raise the prices to international levels during Repelita IV. To assess the government policy, the price of refined oil for domestic consumption was introduced into the core model as a policy variable. We also sought to introduce a government-regulated price index, made of prices of commodities such as rice and sugar, in order to assess the impact of government price policy on the rate of inflation and other variables. But lack of data prevented us from making an adequate price index, which should be constructed in the future.

Money supply, which is the nominal supply of broad money in our model, and the loans to the private sector, which is the amount of credit supplied to the private sector by the monetary

system, are introduced into our model as government monetary policy variables. As mentioned later, we had difficulty in incorporating these variables into the core model. Exchange rate is one of the most important policy variables.

Other exogenous variables which play an influential role in the macroeconomic model are called here "data variables." World, imports, quantity of oil production, and export price of crude oil influence crucially the future course of the Indonesian economy as well as government development policies. Population is treated as a data variable, though it will be a target variable in the long run with the promotion of family planning.

The target variables listed in Fig. 5 are among those required for the economic indicators in the five-year development plan. Such endogenous variables as current balance, rate of inflation and the ratio of foreign aid to government revenue are considered as constraints to the government policies. The Government pursues optimal economic development policies subject to the constraints.

Once endogenous and exogenous variables are determined, structural equations have to be specified and estimated with data for a large enough sample. Broadly, there are two approaches often used in constructing macroeconomic models for developing countries. One emphasizes the supply side, based on the assumption that a shortage of the production capacity of goods and services puts a ceiling on the economic growth of developing countries. We call this "the supply-side approach." The other emphasizes the demand side, based on the assumption that a lack of demand restricts the economic growth of developing countries as well as developed countries. We call this "the demand-side approach." Ideally, both sides should be taken into account simultaneously, for in reality the production and demand sides interact. Emphasis, however, has to be laid on one side or the other in a small econometric model with less than one-hundred equations. A lack of data also compels us to select one approach. Both approaches were tried at the beginning of our model building.

First, the supply-side approach was pursued in the core model. A macro production function of the Cobb-Douglas type was introduced, and private consumption was to be estimated as a residual. But various difficulties were encountered in applying the supply-side approach. One was a lack of data on capital stock and employment. With this approach, sectorial production functions should be estimated. But this was impossible because no data on sectorial capital stock and employment were available. Even on the macro basis, no data on gross capital stock were available. Another difficulty was that the core model based on this approach could not predict the economic slowdowns which occurred in 1982 and 1983. This model also had difficulty predicting up-swings and down-swings within the sample period. For these reasons, the demand-side approach was adopted at the final stage.

Second, a private consumption function was introduced, and the production function was modified slightly and used in a different functional form for estimating employment. That is to say, the employment function was specified based on the assumption that employment was determined on the production function, given the volume of production and capital stock. The core model based on the demand-side approach showed much better performances in the interpolation and extrapolation tests and could trace the declines in growth rate in 1982 and 1983.

Third, the supply-side approach was also applied to the export functions. Exports were divided into three categories: crude oil, gas, and non-oil and non-gas (non-oil exports for short). In specifying each export function, export was essentially estimated as the difference between domestic production and domestic consumption. Good results, however, were not obtained for non-oil exports, so that a non-oil exports function was introduced. As far as crude oil export was concerned, the supply-side approach was adopted in the final version.

After scrutinizing the results of both approaches, the demand-side approach was selected for all functions except those related to crude oil.

## 2. Structural Equations of the Core Model

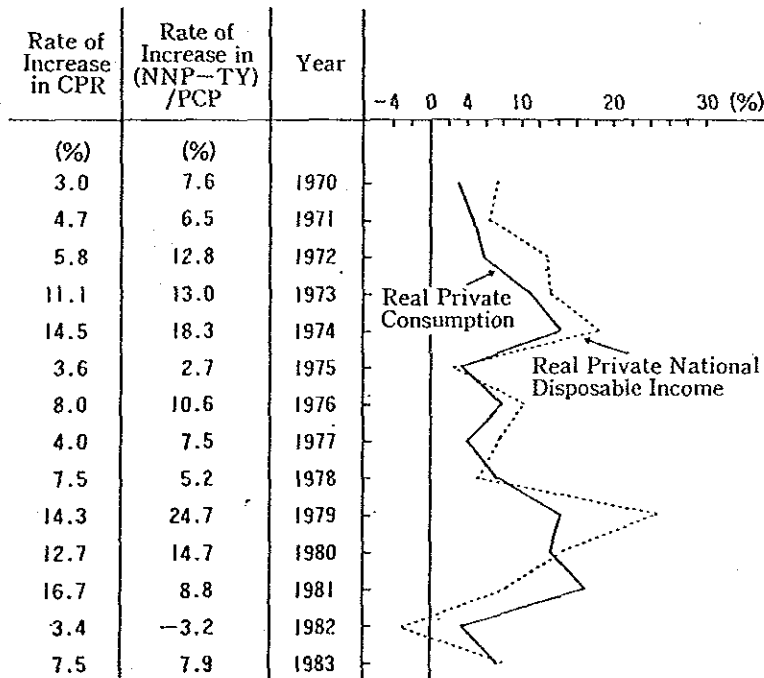
The core model consists of 59 equations: 21 structural equations and 38 identities. The fis-

cal submodel includes 12 tax-and-revenue-sharing equations and one identity. But only the system of equations for the core model is shown in the following "System of Equations." The structural equations of the core model will be explained here. Those of the fiscal submodel are explained in Bappenas and Ministry of Finance (1982). Equation numbers in the following explanations refer to those in the system of equations.

### 2.1 Private Consumption Function (Equation 2)

The private consumption function includes real private national disposable income, real money supply and real private consumption with a one-year time-lag as explanatory variables. Since Indonesian national accounts do not include the income and outlay accounts of the household sector, data on household or personal disposable income are not available. The first explanatory variable,  $(NNP-TY)/PCP$ , is a proxy variable for real household disposable income. The second explanatory variable,  $SMB(-1)/PCP(-1)$ , which is real money supply at the end of the previous year, is introduced to represent the real balance effect, through which money supply influences other endogenous variables. Although significant estimates of its coefficient were not always obtained, this explanatory variable was included because the inclusion of money supply in the core model would have become meaningless without money supply in the consumption function. Real private consumption with one-year time-lag,  $CPR(-1)$ , is included based on a distributed lag of the Koyck type.

Fig. 6 Rates of Increase in Real Private Consumption and Real Private National Disposable Income



When the private consumption function was reestimated with the data extended up to 1981, the opposite sign was obtained for the coefficient of real money supply. This seemed to be caused by an extremely high rate of increase in real private consumption relative to real private na-

tional disposable income in 1981. As Fig. 6 shows, the rate of increase in real private consumption is extremely high, 16.7 percent, despite the relatively low rate of increase, 8.8 percent, in real private national disposable income. This type of movement was not observed over the sample period 1969 to 1980, although the same phenomenon took place in 1982. A dummy variable was, therefore, introduced into the private consumption function in Core Model-81 in order to treat the private consumption observation for 1981 as an irregular movement.

This irregularity may be caused by the compilation method of private consumption in the national accounts of Indonesia. Private consumption, nominal and real, is compiled as a residual between the sum of gross domestic product and imports and the sum of final expenditures other than private consumption and increases in inventory.

According to our estimates, the long-term propensity to consume with respect to private national disposable income was 0.613 in Core Model-81 and 0.655 in Core Model-81 and 0.655 in Core Model-83.

## 2.2 Real Gross Domestic Private Fixed Capital Formation (Equation 4)

The stock adjustment principle was employed mainly to provide explanatory variables for real gross domestic private fixed capital formation (IPR, real private investment for short). Real private investment was regressed on real gross domestic product with one-year lag (GDPR (-1)), net capital stock at the end of the previous year (KPR(-1)), and increase in real credit supply to private sector by monetary system (CRFMS/PI). Other investment theories such as the neoclassical type and Tobin's q could not be tried because of lack of data.

Bank loans to the private sector influence other endogenous variables through this equation, although a significant estimate of its coefficient was not obtained.

## 2.3 Exports Functions (Equations 6 through 13, 35 through 40)

Exports of goods and services are disaggregated into three components: oil, gas, and non-oil and non-gas exports. Exports of goods and services in the national accounts of Indonesia are not divided, and data on these components had to be sought from other sources. The sum of these components, therefore, is not necessarily equal to exports of goods and services in the national accounts, but includes statistical discrepancies. Consequently, the statistical equations 13 and 39 were estimated in order to complete the model.

### 2.3.1 Crude Oil Export and Quantity of Refined Oil for Domestic Use (Equations 6 through 10)

As mentioned, the quantity of crude oil export (QXOIL) is obtained as the difference between production and domestic use, as shown by equation 8.

#### (1) Crude Oil Export Identity (Equation 8)

$$QXOIL = QOIL\# - QMOIL\# - QDOIL + QXOSD\#,$$

where QOIL denotes the quantity of crude oil production, QMOIL the quantity of crude oil for domestic consumption and QXOSD statistical discrepancy, and the symbol # indicates that the variables are exogenous.

The quantity of refined oil for domestic consumption QOROL is converted into the quantity of crude oil by equation 9, which follows the technical relation for conversion.

#### (2) Function of the Quantity of Refined Oil for Domestic Consumption (Equation 10)

The quantity of refined oil for domestic consumption (QOROL) is a log-linear function of real total consumption (CR), real total investment (IR) and the ratio of price of refined oil for domestic consumption to consumer price index (PDROL(-1)/PCPI(-1)). The first two explanatory variables represent income effect and the last one represents price effect. Though real GDP was tried as representative of income effect in place of CR and IR, better results were not obtained. The difference in elasticities with respect to consumption and investment are considered to be reasonable. A reasonable and more-or-less stable estimate of price elasticity was also obtained as shown in the system of equations.

It will be desirable in the future version to break down refined oil products into main petroleum products such as kerosene.

### 2.3.2 Real Gas Export (Equation 11)

Gas export (XGASR) is essentially determined exogenously. Almost all of gas export is LNG, and the quantity is determined by the long-term production and export contracts. The export price of gas (BPXGAS) follows that of crude oil, which is an exogenous variable.

### 2.3.3. Real Non-oil and Non-gas Exports Function (Equation 12)

The real non-oil and non-gas exports (XNOSR) function was specified in accordance with the typical theory of demand function. The explanatory variables consist mainly of real world imports (MWR) as the relevant income variable and the ratio of price of non-oil exports (PXNOS) to world export price (PWX) as the relative price variable. One important channel through which world economic conditions influence other endogenous variables is this equation. A dummy variable was introduced to explain unusually sharp declines in 1982 and 1983, without which the equation did not fit well. One reason for the sharp decline was that Indonesia banned the export of lumber and changed its policy for shrimp export. It should be noted that the estimated price elasticity is very low.

## 2.4 Import Functions (Equations 14 through 18, Identities 44 through 48)

Imports of goods and services are disaggregated into four components: consumption goods, investment goods, raw materials and intermediate goods, and services and statistical discrepancy. Like the function of non-oil exports, all imports were regressed on a variable representing income effect and a variable representing price effect.

### 2.4.1 Function of Imports of Consumption Goods (Equation 14)

Imports of consumption goods (MCR) are a function of real total consumption (CR) and the ratio of import deflator for consumption goods to consumption deflator (PMC/PC). A fairly high estimate of price elasticity of consumption-goods-imports demand was obtained. This means that the government policy toward foreign exchange can exert a strong influence on imports of consumption goods, as will be shown in the multiplier analysis.

### 2.4.2 Function of Imports of Investment Goods (Equation 15)

The long-term elasticity of imports of investment goods with respect to real investment in Core Model-81 is 0.945, much higher than that of imports of consumption goods. The difference between the elasticities is reflected in the difference between the multipliers of government consumption and investment, as will be shown later. In Core Model-83, the estimated long-term income elasticity is 1.014, slightly larger than 1.0, although it should be less than or equal to 1.0. These estimates of coefficients indicate that almost all investments have had to be imported because capital goods industries have not yet been developed in Indonesia.

### 2.4.3 Function of Imports of Raw Materials and Intermediate Goods (Equation 16)

Real imports of raw materials and intermediate goods were specified as a function of real GDP (GDPR) and the ratio of import deflator for raw materials and intermediate goods to GDP deflator (PMRM/PGDP). Fairly stable estimates of the coefficients were obtained. The fit also improved as more recent data were added to the sample.

### 2.4.4 Function of Imports of Services and Statistical Discrepancy (Equation 17)

Satisfactory results were not always obtained in terms of fit, although a stable coefficient was estimated for each version. This is due to a defect in the way the data were compiled. The data on imports of services and statistical discrepancy (MSDR) were compiled as the difference between real imports of goods and services (MR) in the national accounts and the sum of MCR, MIR, and MRMR, which were obtained from other data sources. MSDR, therefore, includes not only imports of services but also statistical discrepancy. The problem is that MSDR accounts for more than half of MR.

## 2.5 Depreciation Function (Equation 19)

Depreciation is essentially related to capital stock. But in practice, firms accelerate depreciation when they earn better profits, and vice versa. GDP/capital ratio was introduced as a profitability variable in place of profit/capital ratio which was not available. There are two kinds of real depreciation introduced in Core Models-81 and 83. One is real total depreciation, which is needed to derive net national product from gross national product (see equations 54 and 55). The other is net private depreciation, which is used for deriving real private capital stock (see equation 20 (2)).

## 2.6 The Employment Function

The employment function is, as mentioned, derived from the production function together with the adjustment principle. Desired labor demand is assumed to be determined by the production function, given capital stock and output. Let EMP denote desired labor demand. Then we have,

$$\ln EMP^* = a_0 + a_1 \ln GDP - a_2 \ln KR(-1), \text{ where } a_1 > 0, a_2 > 0.$$

But firms cannot adjust their employment to the desired level within one year due to various costs involved. So they are assumed to adjust their employment partially. This is formulated as follows,

$$(\text{EMP}/\text{EMP}(-1)) = \lambda (\text{EMP}^*/\text{EMP}(-1)), \text{ where } 0 < \lambda < 1.$$

Substituting EMP\* into this equation and taking logarithms of both sides gives the following labor demand function:

$$\ln EMP = a_0 \lambda + a_1 \lambda \ln GDP - a_2 \lambda \ln KR(-1) + (1 - \lambda) \ln EMP(-1).$$

The parameter  $\lambda$  represents the speed of adjustment. If  $\lambda$  is large, firms quickly adjust their employment level to the desired level. If  $\lambda = 1$ , firms adjust their employment completely within one year. According to our estimate of  $\lambda$ , it takes firms about two or three years to adjust their employment to the desired level.

When we used this employment equation, we found that the substitution between capital and labor worked too strongly in the long-term extrapolation. The capital stock variable was, therefore, dropped in the alternative specification of the employment function.

## 2.7 Labor Force Function (Equation 22)

Labor force (LABF) is simply a function of population (N). Labor force may be exogenously determined by demographic factors. If data on wages were available they would be introduced into this equation.

## 2.8 Price Functions (Equations 25, 26, 27, and 57)

Two approaches were tried for specifying deflator functions in the core model. One approach is first to specify GDP deflator in accordance with some theory, then to specify other deflators as a function of GDP deflator and other variables. The other is first to estimate individual deflator functions, then to obtain GDP deflator as the ratio of nominal GDP to real GDP. The latter approach is adopted in most other macroeconomic models.

According to the former, GDP deflator plays a central and crucial role in price determination. First, the monetary approach was applied to the specification of the GDP deflator function in the core model. Good results were not obtained, however, especially for the extrapolation. Consequently, the latter approach was adopted in the final version of the core model. In each function the shift parameters of demand and supply functions are basically used as explanatory variables, for prices are assumed to be determined at the intersection of demand and supply schedules.

GDP deflator is determined as an implicit deflator by equation 51.



### 2.8.1 Private Consumption Deflator Function (Equation 25)

Private consumption deflator (PCP) is a function of real private consumption (CPR), labor productivity (GDPR/EMP), and price of refined oil for domestic consumption (PDROL) in Core Model-81. As mentioned, we sought to introduce a government-regulated price index into this function. PDROL was introduced in place of the price index. A dummy variable was used to eliminate the effect of the irregularity of private consumption in 1981 and 1982. In the 83 version, unfortunately, a significant estimate was not obtained for the coefficient of (GDPR/EMP).

ln PCP	Core Model-81	Core Model-83
Const.	-19.4192 (-3.22)	-15.6669 (-8.85)
ln CPR	1.9533 (3.61)	1.7698 (6.92)
ln $\left(\frac{\text{GDPR}}{\text{EMP}}\right)$	-1.0475 (-1.04)	
ln PDROL (-1)	0.3339 (1.60)	0.1323 (0.89)
DUMPC	-0.373625 (-4.01)	-0.2294 (-4.01)
R <sup>2</sup>	0.986	0.990

### 2.8.2 Consumer Price Index Function (Equation 57)

Consumer price index (PCPI) was simply regressed on PCP, as both are of the same kind. PCP covers all goods and services, whereas the coverage of consumer price index is limited. The main difference theoretically is that consumer price index is of the Laspyres type and PCP is of the Paasche type.

### 2.8.3 Government Consumption Deflator Function (Equation 26)

Government consumption consists mainly of the compensation of government employees and the goods and services which the Government purchases. Government consumption deflator (GDP), therefore, should be a function of the wage rate of government employees and the price of the goods and services. But as the wage rate was not available, PCG was regressed on a kind of domestic demand deflator  $(CP+I)/(CPR+IR) = PCP*CPR/(CPR+IR)+PI*IR/(CPR+IR)$ .

### 2.8.4 Investment Deflator Function (Equation 27)

Investment deflator (PI) is a function of labor productivity, money supply (SMB) and import deflator of investment goods (PMI). We tried to introduce real total investment (IR) in place of SMB, but a significant coefficient of productivity could not be obtained.

Because most investment goods are imported, PMI is assumed to be a dominant factor for PI, but the assumption was not fully supported by our results. This may be ascribed to construction investment.

## 2.9 Production Function and Capacity Output (Equations 1 and 58)

The production function of the Cobb-Douglas type was estimated. The capacity output equation was derived from the production function by shifting the production function upward by the amount of maximum residual within the sample period. (For details, see appendix B in Kuribayashi (1982).)

Capacity output was used in our model to compare real GDP with capacity output (GDPR). GDPR/GDPRC ratio more or less expressed a kind of capacity utilization.

## 2.10 Tax Function (Equations 53 and 56)

Two tax functions were estimated in the core model: a net indirect tax equation and a direct income tax equation. When the core model and the fiscal submodel are integrated, these equations are replaced by the corresponding equations in the fiscal submodel.

## 3. System of Equations

Notes: 1. The symbol # denotes exogenous variables.

2. The first figure in parentheses after an equation name shows the equation number in Indonesia's Economic Development and Bappenas Macroeconometric Model, 1969-1980 by K. Kobayashi (1982), and the second figure is its number in Model Makroekonometri Inti Indonesia by Bappenas (1982).

3. RR denotes the coefficient of determination adjusted for degrees of freedom, s the standard deviation of disturbances and DW Durbin-Watson ratio.

4. The figures in parenthesis below coefficients are t-values of the coefficients.

5. The sample period is from 1969 through 1983.

### 1. Real Gross Domestic Product (1,1)

$$\ln(\text{GDPR}/\text{EMP}) = -0.885399 + 0.6830 \ln(\text{KR}(-1)/\text{EMP})$$

(-14.67) (13.94)

$$\text{RR} = 0.937 \quad s = 0.0461 \quad \text{DW} = 0.47 \quad \text{For Model I}$$

or

$$\text{GDPR} = \text{CR} + \text{IR} + \text{XR} + \text{MR} \quad \text{For Model II}$$

### 2. Real Private Consumption Expenditure (10,14)

$$\text{CPR} = \text{GDPR} - (\text{CGR} + \text{IR} + \text{XR} - \text{MR}) \quad \text{For Model I}$$

or

$$\text{CPR} = 392.24 + 0.3082(\text{NNP} - \text{TY})/\text{PCP} + 0.3475(\text{SMB}\# + \text{SMB}\#(-1))/2/\text{PCP} + 0.5296\text{CPR}(-1)$$

(0.85) (3.60) (0.52) (3.29)

$$\text{PR} = 0.996 \quad s = 170.4 \quad \text{DW} = 2.04 \quad \text{For Model I}$$

### 3. Real Consumption Expenditure (9,15)

$$\text{CR} = \text{CPR} + \text{CGR}\#$$

### 4. Real Gross Domestic Private Fixed Capital Formation (12,23)

$$\ln\text{IPR} = -6.0734 + 2.3411 \ln\text{GDPR}(-1) - 0.9869 \ln\text{KPR}(-1) + 0.0609 \ln(\text{CRFMS}/\text{PI})$$

(2.26) (1.41) (-0.68) (0.71)

$$\text{PR} = 0.921 \quad s = 0.117 \quad \text{DW} = 1.26$$

### 5. Real Gross Domestic Fixed Capital Formation (11,24)

$$\text{IR} = \text{IPR} + \text{IGR}\#$$

### 6. Real Export of Crude Oil (14,31)

$$\text{XOILR} = (\text{XOIL}\$ * 415.0) / (\text{PXOIL}\# / 4.0094) * 1/1000$$

### 7. Value of Oil Export in US\$(15,30)

$$\text{XOIL}\$ = \text{PXOIL}\# * \text{QXOIL}$$

### 8. Quantity of Crude Oil Export (16,29)

$$\text{QXOIL} = \text{QOIL}\# + \text{QMOIL}\# - \text{QDOIL} + \text{QXOSD}\#$$

### 9. Quantity of Crude Oil for Domestic Use (17,28)

$$\text{QDOIL} = 1/0.7 * (1/158.99 * \text{QDOROL} - \text{QMROL}\#)$$

10. Quantity of Refined Oil for Domestic Use (18,27)  
 $\ln QDROL = 1.10478 + 0.35421 \ln CR + 0.6686 \ln IR - 0.2672 \ln(PDROL(-1)/PCPI(-1))$   
(2.02) (2.54) (6.85) (6.22)  
PR = 0.997 s = 0.0278 DW = 2.43

11. Real Export of Gas (19,30)  
 $XGASR = (XGASS\#*415.0)/PXGAS\#*1/1000$

12. Real Non-oil and Non-gas Exports (20,32)  
 $\ln XNOSR = 0.258415 + 0.9814 \ln MWR\# - 0.1129 \ln(PXNOS\#(-1)/PWX\#(-1))$   
(0.51) (12.3) (-2.43)  
-0.2451DUM8182  
(-10.44)  
PR = 0.953 s = 0.0303 DW = 2.62

13. Real Total Export (13,34)  
 $XR = 166.24 + 0.9422(XOILR + XGASR + XNOSR)$   
(1.44) (11.29)  
PR = 0.900 s = 113.26 DW = 1.17

14. Real Imports of Consumption Goods (23,41)  
 $\ln MCR = 2.75952 - 1.70461 \ln(PMC/PC) + 0.2892 \ln CR$   
(1.42) (4.88) (1.33)  
PR = 0.873 s = 0.189 DW = 1.43

15. Real Imports of Investment Goods (24,42)  
 $\ln MIR = -0.7968 - 0.97971 \ln(PMI/PI) + 0.75341 \ln IR + 0.2468 \ln MIR(-1)$   
(-1.09) (3.27) (3.50) (1.45)  
PR = 0.919 s = 0.141 DW = 0.94

16. Real Imports of Raw Materials and Intermediate Goods (25,43)  
 $MIRMR = -120.56 - 159.2 (FMFM/PGDP) + 0.0984 GDP$   
(-0.75) (-1.68) (10.43)  
PR = 0.984 s = 48.32 DW = 2.01

17. Real Imports of Services and Real Statistical Discrepancy (26,44)  
 $\ln MSDR = -17.0284 + 2.6458 \ln GDP$   
(-6.99) (9.79)  
PR = 0.871 s = 0.3289 DW = 1.34

18. Real Total Import (22,45)  
 $MR = MCR + MIR + MIRMR + MSDR$

19. Real Depreciation (8,3)  
(1)  $DEPR = -745.65 + 1216.97(GDPR/KR(-1)) + 0.0388 KR(-1)$   
(-4.44) (5.33) (18.17)  
PR = 0.987 s = 19.49 DW = 0.57  
(2)  $DEPPR = -1225.18 + 564.222(GDPR/KPR(-1)) + 0.1685 KPR(-1)$   
(2.70) (2.55) (13.14)  
PR = 0.982 s = 32.34 DW = 2.03

20. Real Capital Stock (7,13)  
(1)  $KR = KR(-1) + IR - DEPR$   
(2)  $KPR = KPR(-1) + IPR - DEPPR$

21. Employment (4,10)  
 $\ln EMP = 3.22128 + 0.1702 \ln GDP + 0.55871 \ln EMP(-1)$   
(2.33) (2.19) (2.89)  
PR = 0.994 s = 0.00938 DW = 0.84 For Model I  
or  
 $\ln EMP = 2.21448 + 0.2273 \ln GDP - 0.0862 \ln KR(-1) + 0.6810 \ln EMP(-1)$   
(1.80) (3.28) (2.39) (4.00)  
PR = 0.996 s = 0.00786 DW = 1.52 For Model II

22. Labor Force (5, 11)  

$$\text{LABF} = -26331.6 + 0.5635N\#$$

$$(-18.11) \quad (52.38)$$

$$\text{PR} = 0.995 \quad s = 550.85 \quad \text{DW} = 0.40$$
23. Unemployment (6, 12)  

$$\text{UNEM} = \text{LABF} - \text{EMP}$$
24. Real Gross National Product (2,2)  

$$\text{GNPR} = \text{GDPR} + \text{NFIAR}\#$$
25. Private Consumption Deflator (32,16)  

$$\ln\text{PCP} = -15.6669 + 1.7698 \ln\text{CPR} + 0.1323 \ln\text{PDROL}(-1) + 0.2294\text{DUM} 7080$$

$$(-8.85) \quad (6.92) \quad (0.89) \quad (-4.01)$$

$$\text{PR} = 0.990 \quad s = 0.0641 \quad \text{DW} = 1.28$$
26. Government Consumption Deflator (29,17)  

$$\text{PCG} = -0.0642 + 1.0396((\text{CP} + \text{I})/(\text{CPR} + \text{IR}))$$

$$(-1.04) \quad (70.03)$$

$$\text{PR} = 0.997 \quad s = 0.0684 \quad \text{DW} = 2.26$$
27. Investment Deflator (30,25)  

$$\ln\text{PI} = -4.4014 - 0.4412 \ln(\text{GDPR}/\text{EMP}) + 0.5201 \ln\text{SMB}\# + 0.1351 \ln\text{PMI}$$

$$(-2.27) \quad (-0.69) \quad (4.41) \quad (1.45)$$

$$\text{PR} = 0.994 \quad s = 0.0495 \quad \text{DW} = 1.57$$
28. Nominal Private Consumption Expenditure (44 or 31,20)  

$$\text{CP} = \text{PCP} * \text{CPR}$$
29. Nominal Government Consumption Expenditure (45,21)  

$$\text{CG} = \text{PCG} * \text{CGR}$$
30. Nominal Total Consumption Expenditure (43,22)  

$$C = \text{CP} + \text{CG}$$
31. Total Consumption Deflator ( ,18)  

$$\text{PC} = C/\text{CR}$$
32. Nominal Gross Domestic Private Fixed Capital Formation  

$$\text{IP} = \text{PI} * \text{IPR}$$
33. Nominal Government Investment  

$$\text{IG} = \text{PI} * \text{IGR}$$
34. Nominal Gross Domestic Fixed Capital Formation (46,26)  

$$I = \text{PI} * \text{IR} (= \text{IP} + \text{IG})$$
35. Nominal Oil Export (48,36)  

$$\text{XOIL} = \text{XOIL}\$ * \text{RFEX}\# * 1/1000$$
36. Nominal Gas Export (49,39)  

$$\text{XGAS} = \text{XGAS}\$ * \text{RFEX}\# * 1/1000$$
37. Nominal Non-oil and Non-gas Exports (50,38)  

$$\text{XNOS} = \text{XNOS}\$ * \text{RFEX}\# * 1/1000$$
38. Value of Non-oil and Non-gas Exports in US\$ (21, 37)  

$$\text{XNOS}\$ = \text{XNOSR} * \text{PXNOS}\# * 1000/415.0$$
39. Nominal Total Export (47,40)  

$$X = -74.40 + 1.0489 (\text{XOIL} + \text{XGAS} + \text{XNOS})$$

$$(-1.01) \quad (115.22)$$

$$\text{PR} = 0.999 \quad s = 196.9 \quad \text{DW} = 1.42$$
40. Export Deflator (34,35)  

$$\text{PX} = X/\text{XR}$$
41. Import Deflator for Consumption Goods (36,46)  

$$\text{PMC} = \text{PMC}\$ * \text{RFEX}\# / 415.0$$
42. Import Deflator for Investment Goods (37,47)  

$$\text{PMI} = \text{PMI}\$ * \text{RFEX}\# / 415.0$$

43. Import Deflator for Raw Materials and Intermediate Goods (38,48)  
 $PMRM = PMRM\$ \# * RFEX \# / 415.0$
44. Nominal Imports of Consumption Goods (52,50)  
 $MC = PMC * MCR$
45. Nominal Imports of Investment Goods (53,51)  
 $MI = PMI * MIR$
46. Nominal Imports of Raw Materials and Intermediate Goods (54,52)  
 $MRM = PMRM * MRMR$
47. Nominal Imports of Services and Statistical Discrepancy (55,53)  
 $MSD = PMSA \# * MSDR$
48. Nominal Total Import (51,54)  
 $M = MC + MI + MRM + MSD$
49. Import Deflator (35,49)  
 $PM = M / MR$
50. Nominal Gross Domestic Product (39,6)  
 $GDP = C + I + X - M$
51. Deflator for Gross Domestic Product (28,5)  
 $PGDP = GDP / GDPR$
52. Nominal Gross National Product (40,7)  
 $GNP = GDP + FM * NFIAR$
53. Nominal Net Indirect Tax  
 $TI = 141.46 + 0.03196 \text{ GDP}$   
(3.89) (28.79)  
 $PR = 0.983 \quad s = 94.85 \quad DW = 1.20$
54. Nominal Depreciation (42,8)  
 $DEP = PGDP * DEPR$
55. Nominal Net National Product (41,9)  
 $NNP = GNP - DEP - TI$
56. Direct Income Tax  
 $TY = -47.66 + 0.02871 \text{ NNP}$   
(-1.88) (32.03)  
 $PR = 0.987 \quad s = 66.11 \quad DW = 1.27$
57. Consumer Price Index ((33,19)  
 $\ln PCPI = 3.85035 + 1.02984 \ln PCP$   
(208.66) (45.22)  
 $PR = 0.993 \quad s = 0.0573 \quad DW = 0.93$
58. Capacity Output  
 $\ln(GDPRC/EMP) = -0.86840 + 0.6830 \ln(KR(-1)/EMP)$
59. Real Net Factor Income from Abroad  
 $NFIAR = -68.11 - 0.1884(XOIL + XGAS)/FM$   
(-2.32) (-14.29)  
 $PR = 0.936 \quad s = 65.0 \quad DW = 1.46$

#### 4. Notation of the Variables

- Notes: 1. The symbol # denotes exogenous variables.  
2. Real = 1973 constant price.  
Nominal = current price.

C = Nominal Consumption Expenditure  
CG = Nominal Government Consumption Expenditure  
CGR# = Real Government Consumption Expenditure

CP = Nominal Private Consumption Expenditure  
 CPR = Real Private Consumption Expenditure  
 CR = Real Consumption Expenditure  
 CRPSM# = Amount of Credit Supply to Private Sector by Monetary System  
 DEP = Nominal Depreciation  
 DEPPR = Real Private Depreciation  
 DEPR = Real Depreciation  
 DUM7080 = Dummy Variable for Private Consumption Deflator (1 for 1970-1980,  
 0 for 1980-1983)  
 DUM8182 = Dummy Variable for Non-oil and Non-gas Exports (1 for 1981-1982,  
 0 otherwise)  
 EMP = Total Employment  
 GDP = Nominal Gross Domestic Product  
 GDPR = Real Gross Domestic Product  
 GDPRC = Real Capacity Output  
 GNP = Nominal Gross National Product  
 GNPR = Real Gross National Product  
 I = Nominal Gross Domestic Fixed Capital Formation  
 IG = Nominal Gross Government Fixed Capital Formation  
 IGR# = Real Gross Government Fixed Capital Formation  
 IP = Nominal Gross Domestic Private Fixed Capital Formation  
 IPR = Real Gross Domestic Private Fixed Capital Formation  
 IR = Real Gross Domestic Fixed Capital Formation  
 KPR = Real Private Capital Stock  
 KR = Real Total Capital Stock  
 LABF = Total Labor Force  
 M = Nominal Total Import  
 MC = Nominal Imports of Consumption Goods  
 MCR = Real Imports of Consumption Goods  
 MI = Nominal Imports of Investment Goods  
 MIR = Real Imports of Investment Goods  
 MR = Real Total Import  
 MRM = Nominal Imports of Raw Materials and Intermediate Goods  
 MRMR = Real Imports of Raw Materials and Intermediate Goods  
 MSD = Nominal Statistical Discrepancy for Import Sector  
 MSDR = Real Statistical Discrepancy for Import Sector  
 MWR# = Real World Imports  
 N# = Population  
 NFIA = Nominal Net Factor Income from Abroad  
 NFIAR = Real Net Factor Income from ABroad  
 NNP = Nominal Net National Product  
 NNPR = Real Net National Product  
 PC = Private Consumption Deflator  
 PCPI = Consumer Price Index  
 PDROL# = Price of Refined Oil for Domestic Consumption  
 PGDP = GDP Deflator  
 PI = Fixed Capital Formation Deflator  
 PM = Import Deflator  
 PMC = Import Deflator for Consumption Goods  
 PMC\$# = Dollar Price Index for Consumption Goods Imports  
 PMI = Import Deflator for Investment Goods  
 PMI\$# = Dollar Price Index for Investment Goods Imports

PMRM = Import Deflator for Raw Materials and Intermediate Goods  
 PMRMS# = Dollar Price Index for Raw Materials and Intermediate Goods Imports  
 PMSD# = Import Deflator for Services and Statistical Discrepancy  
 PX = Export Deflator  
 PXGAS# = Price Index of Gas Export in US\$  
 PXNOS# = Price Index of Non-oil and Non-gas Exports in US\$  
 PXOIL# = Export Price of Crude Oil in US\$ per barrel  
 PWX# = World Export Price  
 QDOIL = Quantity of Crude Oil for Domestic Consumption in million barrels  
 QDROL = Quantity of Refined Oil for Domestic Consumption in million barrels  
 QMOIL# = Quantity of Crude Oil Import in million barrels  
 QMROL# = Quantity of Refined Oil Import in million barrels  
 QOIL# = Quantity of Oil Production  
 QXGAS = Quantity of Export of LNG  
 QXOIL = Quantity of Crude Oil Export in million barrels  
 QXOSD# = Statistical Discrepancy for the Quantity of Oil Export  
 RFE# = Rate of Foreign Exchange  
 SMB# = Nominal Supply of Broad Money  
 TI = Nominal Net Indirect Tax  
 TIME# = Time Trend  
 TIR = Real Net Indirect Tax  
 TY = Direct Income Tax  
 UNEM = Unemployment  
 X = Nominal Total Export  
 XGAS = Nominal Value of Gas Export in billion Rp  
 XGAS\$# = Nominal Value of Gas Export in million US\$  
 XGASR = Real Gas Export in billion Rp  
 XNOS = Nominal Value of Non-oil and Non-gas Export in billion Rp  
 XNOS\$ = Nominal Value of Non-oil and Non-gas Exports in million US\$  
 XNOSR = Real Non-oil and Non-gas Exports in billion Rp  
 XOIL = Nominal Value of Crude Oil Export in billion Rp  
 XOIL\$ = Nominal Value of Crude Oil Export in million US\$  
 XOILR = Real Crude Oil Export in billion Rp  
 XR = Real Total Export

#### IV. MULTIPLIER ANALYSIS

One of the primary advantages of making use of econometric models for economic planning is to be able to evaluate policy effects quantitatively. The short- and medium-term impact of policy variables on target variables are analyzed with Core Model-81 in this section.

To measure the impacts of changes in an exogenous variable on endogenous variables, all endogenous variables are first solved over the pre-assigned period with given values of all exogenous variables. This set of estimates of all endogenous variables is usually called a "control solution" or "standard solution." Second, the values of specific exogenous variables are changed by a fixed amount and the model is solved for endogenous variables. We call this set of values of all endogenous variables a "disturbed solution." Then, the impacts can be assessed by comparing the disturbed solution with the control solution, the differences between them usually being taken.

With respect to real government investment (IGR) and real government consumption (CGR), each of them was increased by 100 billion rupiahs every year in each simulation. This is called

"sustained increase" hereafter. The differences between the disturbed solution and the control solution for real GDP, total real demand and balances of international trade of goods and services are shown in Table 5. Multipliers can be obtained by dividing the values of each endogenous variable by the changes in real government investment or consumption, 100. To take real GDP for example, the impact multiplier is 0.625, and the medium-term multiplier reaches its highest value, 0.764, in the second year and declines in subsequent years. In developed countries such as the United States and Japan, the impact multiplier is usually around 1.3 and the medium-term multiplier peaks at around 2.0. These low multipliers for real government investment in the Indonesian economy are ascribed to high leakage through direct and indirect imports, as mentioned above concerning import functions. According to an econometric model for the Republic of Korea constructed by the Economic Research Institute, Economic Planning Agency, Japan, government investment multipliers are also less than 1.0. This may be a common feature of developing countries. In comparison with IGR multipliers, CGR multipliers, which are slightly larger than 1.0 at the peak, are larger.

Table 5 IGR and CGR Multipliers (Unit: billion rupiahs)

	1983	1984	1985	1986	1987	1988
Real GDP IGR	62.5	76.4	70.7	61.5	54.6	50.2
CGR	81.6	104.4	100.7	91.3	84.4	80.5
Total Real IGR	114.8	147.0	141.8	127.9	117.2	111.4
Demand CGR	136.6	183.5	182.4	168.2	157.0	151.4
X - M IGR	-297.9	-422.2	-466.6	-477.6	-492.2	-521.7
	(-0.331)	(-0.435)	(-0.458)	(-0.447)	(-0.438)	(-0.442)
CGR	-171.2	-316.3	-356.1	-349.7	-341.8	-349.3
	(-0.190)	(-0.326)	(-0.350)	(-0.327)	(-0.304)	(-0.296)

- Notes: 1. These figures are based on sustained increase of 100 billion rupiahs in real government investment and consumption respectively.
2. The figures in parentheses are measured in billions of U. S. dollars.
3. X = exports of goods and services at current prices.
4. M = imports of goods and services at current prices.

Instead of a sustained, fixed amount of increase in an exogenous variable, the impacts of a sustained percentage increase were estimated for the quantity of crude oil production (QOIL), export price of crude oil (PXOIL) and foreign exchange rate (RFEX), and are shown in Table 6.

Comparison between QOIL and PXOIL shows that the sustained one-percent increase in crude oil production has a larger effect than the same increase in the export price of crude oil. Simply dividing the results for RFEX by five tells us that a sustained one-percent devaluation of foreign exchange has the same effects on the growth rate of real GDP as the same increase in crude oil production, but much larger effect on tax revenue and trade balance.



Table 6 QOIL, PXOIL, and RFEX Multipliers

	1984	1985	1986	1987	1988	1989
Growth Rate of QOIL	0.08	0.11	0.10	0.08	0.07	0.05
Real GDP PXOIL	0.04	0.05	0.05	0.03	0.02	0.01
(%) RFEX	0.44	0.56	0.50	0.39	0.30	
Total tax QOIL	80.0	275.5	530.0	859.4	1276.9	1783.1
(billion PXOIL	84.4	270.3	494.0	766.8	1074.3	1420.5
rupiahs) RFEX	595.8	2440.6	4792.2	7620.6	10933.0	
X-M QOIL	0.120	0.256	0.413	0.597	0.813	1.043
(billions of PXOIL	0.133	0.265	0.415	0.573	0.726	0.885
U.S.dollars) RFEX	0.744	1.593	2.668	4.064	5.863	

Notes: 1. Sustained one-percent increase for QOIL and PXOIL.  
2. Sustained five-percent increase for RFEX.

#### V. CONCLUDING REMARKS

As mentioned in Repelita IV, macroeconomic models were employed in order to obtain a better consistency in the planned macroeconomic aggregates. Numerous policy simulations were conducted with the macroeconometric model before a final conclusion was reached. In our experience with Indonesian development planning, macroeconometric models can play a central role and give fresh and deep insights into the problems and issues in the future and policy measures for dealing with them.

One advantage of employing macroeconometric models for economic planning is that the actual course of the economy can easily be compared quantitatively with the planned one, and the planned policy measures can be revised if necessary, while implementing the plan year by year. This means that a rolling plan can be introduced.

For that purpose, the macroeconometric models have to be re-estimated with extended data and revised every year if necessary. The core model and the fiscal submodel have so far been re-estimated three times. Fairly stable parameters were estimated for structural equations, although a one-year extension of the data has a significant influence because of the smallness of the sample size.

Needless to say, there exist several shortcomings in the core model, which are mainly attributable to lack of data. These shortcomings have to be remedied and the core model revised in the following directions.

- (1) Price equations have to be revised, introducing wage rate and government-regulated price index into them. In particular, the investment deflator function needs to be re-specified without money supply in the explanatory variables.
- (2) It is desirable that the quantity of refined oil for domestic consumption should be disaggregated into components such as kerosene. This will be closely related to the energy submodel which has not yet been completed.
- (3) If available, data on imports of investment goods which are directly related to government investment should be compiled and used in the core model.
- (4) It is desirable that non-oil exports should be disaggregated at least into primary commodities, manufactured goods, and services.
- (5) Reliable data on labor force, employment, and population have to be compiled, because they

belong to the most important economic indicators in the Indonesian economy.

(6) Indonesian national accounting data do not include national disposable income and its appropriation accounts and income and outlay accounts by institutional sectors. Although this shortcoming is common in developing countries, high priority should be given to their compilation. If they are provided, our models will be markedly improved.

(7) Our macro models will be improved and refined by comparing them with macro models of other developing countries. In other words, some study and research will be needed on constructing the same kind of macro models for other developing countries.

#### NOTES

\* I am grateful to Shinichi Ichimura, Kazumi Kobayashi, Sumimaru Odano, and Takao Oshika for many helpful conversations and useful comments. I also thank Adrianus Mooy and other staff members of A Quantitative Study on the Medium/Long-term Prospect of the Indonesian Economy for their warm hospitality and help during my stay in Indonesia.

1) The monetary submodel was successfully connected with the core model, but when we tried to integrate the core model with the monetary submodel as well as the fiscal submodel, we encountered difficulties with the computer capacity. For the monetary submodel, see Ezaki (1982) and Odano (1983a).

2) For detailed explanation of the fiscal submodel and the balance-of-payments submodel, see Bappenas and Ministry of Finance (1982) and Odano (1983b).

3) The dividing line between low-income and middle-income economies is 410 dollars at 1982 prices based on the World Bank's classification.

4) Though the export price of crude oil decreased by five dollars per barrel, the terms of trade in 1983 improved. This is due to increases in export prices of primary goods because of recovery in the world market for those goods.

#### REFERENCES

- Ezaki, Mitsuo. 1982. A Monetary Submodel of the Bappenas Model. National Development Planning Agency (Bappenas), Indonesian Government. (Mimeographed)
- Indonesia, Bappenas. 1982. Model Makroekonomi Inti Indonesia. Bappenas, Indonesian Government. (Mimeographed)
- Indonesia, Bappenas; and Ministry of Finance. 1982. An Econometric Analysis of Indonesia Fiscal Sector -- A Tentative Report--. Bappenas, Indonesian Government. (Mimeographed)
- Kobayashi, Kazumi. 1982. Indonesia's Economic Development and Bappenas Macroeconomic Model, 1969-1980. Bappenas, Indonesian Government. (Mimeographed)
- Kuribayashi, Sei. 1982. Revised Core Macro Econometric Model. Bappenas, Indonesian Government. (Mimeographed)
- , 1983a. Revised Core Macro Econometric Model Re-estimated. Bappenas, Indonesian Government. (Mimeographed)
- , 1983b. Multiplier Analysis by the Macro Econometric Model. Bappenas, Indonesian Government. (Mimeographed)
- Odano, Sumimaru. 1983a. Re-estimation of the Ezaki Model of the Indonesian Monetary Sector. Bappenas, Indonesian Government. (Mimeographed)
- , 1983b. Indonesian Balance of Payments. Bappenas, Indonesian Government. (Mimeographed)
- Oshika, Takao. 1984. Revised Core Macro Econometric Model Re-estimated. Bappenas, Indonesian Government. (Mimeographed)
- The Technical Team. 1982. Bappenas Core Macroeconomic Model. Bappenas, Indonesian Government. (Mimeographed)

CHAPTER III  
A REVISED MACRO MODEL AND POLICY SIMULATION

Nobuhiko Kosuge  
BAPPENAS, Indonesia  
Economic Planning Agency, Japan

Yasumi Matsumoto  
Teikoku Women's Junior College, Japan



## I. INTRODUCTION

The new series of national income statistics of Indonesia was issued in November, 1985. This series not only changes the base year from 1973 to 1983 but also contains many improvements: for example, consistency is maintained with the Input-Output Table, and private consumption is estimated independently, whereas it was calculated as a residual in the old series.

Since the change was so drastic, it was necessary to thoroughly rebuild Core Model-81, which is explained in the previous chapter.

Although the new model employs the new series of national income statistics, we also employ our estimated data from 1971 to 1982 because the new series is published only for 1983 and after ([Kosuge; Matsumoto 1986a], [Kosuge; Matsumoto 1986b], [Matsumoto; Kosuge 1986]).

Before explaining the new econometric model, it may be convenient to give a quick overview of the Indonesian economy since 1971 with newly estimated data of national income statistics. This view differs from that given for Core Model-81 in the previous chapter.

## II. OVERVIEW OF THE INDONESIAN ECONOMY (1971-1985)

Per capita GDP in Indonesia exceeded US\$ 100 in 1972, jumped in 1974, the year of the first oil crisis, and was over US\$ 300 in 1976. Thereafter, the pace of growth slowed for several years. In 1980, the year after the second oil crisis, it rose by about US\$ 140 over the previous year and reached the level of US\$ 500. By 1982 it exceeded US\$ 600, since when it decreased to around US\$ 530 because of the world recession since the early 1980s, the resultant slump in the price of primary goods, and the recent fall of oil prices. More than these, however, the decrease of per capita GDP since 1983 has due to a big depreciation of rupiah. Real per capita GDP in rupiah has steadily increased, except in 1985, when it dropped slightly from the previous year. Therefore, it may be said that, in general, the standard of living in Indonesia has improved steadily in spite of big fluctuations in the world economy.

Each component of GDP clearly shows the influences of the two oil crises and the unfavourable turn of terms of trade since 1982. The ratio of total consumption to GDP has gradually decreased in nominal terms, except for just after the oil crises. On the other hand, it decreased in real terms from 1971 to 1973, but has risen since the first oil crisis. The ratio of investment in nominal terms has been stable at around 20%, except for a high ratio from 1981 to 1983 and a low ratio in recent years, while in real terms it decreased from 1971 to 1973, then took an up-turn, and has shown similar movement to that in nominal terms since 1981. Before the first oil crisis, consumption was suppressed, that is, savings at home were forced to increase, and the accumulated savings were invested; but after the oil crisis, the improvement of terms of trade led by the increase of oil prices allowed Indonesia to expand both consumption and investment. In the recent years, however, the ratio of investment has slumped greatly because of the world recession.

Government expenditure accounted for around 12% of GDP in nominal terms and about 9% in real terms in the early 1970s but it rapidly expanded after the first oil crisis owing to the increase of oil revenue and exceeded over 20% in 1982. In particular, government investment increased rapidly through the promotion of development policies. Although it represented only about 20% of total investment in the early 1970s, this rose to over 36% in 1982 and nearly 50% in 1985 due to the slump in private investment. However, development budgets were severely cut in fiscal 1986 and 1987. Although ordinary budgets were slightly increased, government expenditure in terms of GDP balance seems to have been heavily decreased, because foreign debt repayment, which is not counted as an item of GDP balance, is rapidly expanding. Since Indonesia has held the principle of keeping a balanced budget, government expenditure reacts more or less neutrally to the business cycle. It tends, however, to lag slightly behind the movements of GDP, because tax revenue heavily depends on the economic situation of the previous year. Private investment also shows a similar tendency, but the movement is rather irregular.

The ratio of exports to GDP has fluctuated greatly in nominal terms, while in real terms it was stable at the level of 40% through the 1970s. (The reason for the apparently high values in real terms is that the oil price in 1983, the price of the base year of national income statistics, was still relatively high.) It has fallen, however, in the 1980s because of the decrease of exports of primary goods and the decrease of export quantity of oil in spite of the increase of the exports of manufactured goods. Exports fluctuate a lot from year to year, which leads to fluctuation in GDP. Private investment tends to lag slightly behind the movement of exports. The ratio of imports to GDP was about 10% in the early 1970s but rapidly expanded later and reached nearly 30% in 1982 and 1983. This rapid expansion of imports was due to favourably improved terms of trade; but the share of real imports has been seriously cut in recent years because of the world recession.

The real contributions of each industry to total GDP are as follows. The share of agriculture decreased gradually until 1977, since when it has stabilized at around 23 to 24%. This apparently reflects the success of agricultural policies, shown by the achievement of self-sufficiency in rice. Mining, mainly oil, gained high shares in the 1970s and early 1980s because of the two oil crises, but it has slumped in recent years. Since, however, the sum of agriculture and mining still accounts for over 40% of GDP, it is obvious that these are still among the nations leading industries. Although manufacturing, electricity and gas, construction and transport and communication are all gradually expanding their shares, all except manufacturing are still minor. Manufacturing presently accounts for slightly more than 10% of GDP. Services and others has steadily increased its share and now exceeds 30%.

Agricultural development, which is the main focus of development policy in Indonesia, has aimed at self-sufficiency in rice, and this has been successful as far as the achievement of this goal is concerned. The import value of cereals, mainly rice, to total imports from around 1969, the year that the first five-year development plan (REPELITA I) started, through the early 1970s reached as high as nearly 20%, while self-sufficiency was achieved in the early 1980s. This success is due to the implementation of irrigation works, introduction of high-yielding crops, strong financial support for fertilizer subsidy, and other factors resulting from an aggressive development policy backed by the expansion of oil and gas revenues in the 1970s. Aid from the World Bank, Japan's Overseas Economic Cooperation Fund (OECF) and others significantly contributed to the deployment of the development policies.

Now, however, these development policies are at a turning point. Since Indonesia suffered directly from the world recession of the 1980s, the annual development budget had to be cut by 22.5% in fiscal 1986 and 6.5% in 1987. Although agricultural development was treated relatively well in the reduced budget, the subsidy on fertilizer suffered heavy cuts. The backbone of the Indonesian economy is still rice farming, and it is very significant that a steady increase of private consumption backed by a firm agricultural base in the recent depression saved the whole economy from disaster.

If heavy cuts in the development budget were to damage the basis of agriculture, the mal-effect on the total economy would be very serious. Alongside agricultural development, the government policy of fostering export industry in order to free the Indonesian economy from its present heavy dependency on oil and gas exports has been one of the main economic policies. The ratio of oil and gas exports to total exports was over 80% in nominal terms in the early 1980s but fell to nearly 70% in 1985. The ratio may have decreased even further because of the sudden fall of oil prices in 1986. Although primary goods accounted for nearly 30% of exports in the late 1970s, the quantity of exports decreased radically in 1981 because of the export ban placed on palm oil and other goods, and in the gloomy worldwide market of 1985, primary goods accounted for only 17.6%. The policy of embargoing primary goods in 1981 aimed at expanding their domestic use as raw materials for manufacturing. For example, production of soap, cleaning materials, shampoo and other products whose main raw material is palm oil has rapidly been increasing in recent years (BPS 1975-1984).

The export value of manufactured goods to total exports was only 2.4% in 1975 and 4.4% in 1980, but it has since sharply jumped to reach 14.2% in 1985. As mentioned, such consumer goods

industries as the manufacture of cleaning materials have gradually developed as import-substitution industries, and to some extent they are effective in saving foreign currency. Apart from the textile industry, however, they have not yet grown into export industries. However, the export of intermediate manufacturing goods like cement is steadily growing and the devaluation of the rupiah in 1983 resulted a big leap of exports. Indonesia's several devaluations since 1970 were effective in restricting imports but not in encouraging exports, because the majority of Indonesian exports were oil, gas and primary goods, which are all inelastic to price. Since, however, the volume of exported manufactured goods has become significant in recent years, the devaluation of Autumn 1986 has brought a remarkable improvement in the current balance through the export expansion of manufactured goods. Although the export of manufactured goods appears to be growing satisfactorily in volume, there are several problems. For example, this growth owes much to currency devaluations, and expansion of manufacturing immediately causes an increase of imports of parts and intermediate materials. Because industrial development in Indonesia is still in its infancy, capital goods industries have not yet been built up, with the result that economic growth is restricted by the balance of payments, because an increase of investment is followed by an immediate increase of imports.

Indonesia needs tax reform to improve tax revenue as well as to further the export promotion policy of non-oil-and-gas goods, because the total economy depends crucially on the government's financial expenditure. For instance, the ratio of oil and gas revenue to the total government revenue was around 70% for 1980 through 1984. A step-by-step tax reform centered on value added tax started in 1984. The new tax system so far appears fairly effective in increasing non-oil-and-gas revenues, but more time is needed to judge the overall effects of the reform.

Unemployment poses a severe problem, because about two million school-leavers enter labour market every year while the job creativity of the Indonesian economy is rather poor. Moreover, there seems to be an enormous number of potentially unemployed in both rural and urban areas. Policies involving job creation through industrial development, transmigration from Java, where the capacity of agriculture to support the population is approaching its limit, to outer islands with rich resources of land and water, and the relaxation of population pressure through family planning are effective to some extent, but they have limitations in the face of the urgency and enormity of the problems posed by today's gigantic population.

These problems are also urged in REPELITAs, especially in REPELITA IV.

### III. THE NEW MACRO ECONOMETRIC MODEL: CORE MODEL MD83V1

#### 1. Framework

The new model, Core Model MD83V1, is in the same line as Core Model-81 in its basic specification and is being a "demand-side model". Since we mainly discuss the differences between the two models here, reference should be made to the basic framework of the former (see also (Kuribayashi 1987)).

The main differences between two models are as follows:

(a) In Core Model-81, exports are classified into exports of oil-gas and exports of non-oil-gas, while imports are classified into imports of consumption goods, imports of capital goods and imports of raw and intermediate goods; and the price deflators are estimated in very roughly. The price elasticity of exports and imports is very important in Indonesia because the exchange rate of the rupiah has been radically devalued several times. Therefore, we tried to estimate exports and imports as accurately as possible this time. For convenience of estimation of price deflators, exports and imports are classified according to the SITC one-digit classification ((Kosuge; Matsumoto 1986c), (Kosuge; Matsumoto 1986d)).

(b) Core Model MD83V1 has a small sector of balance of payments and calculates current and basic balances endogenously, because balance of payments is an important objective variable for economic policies in Indonesia.

(c) A variable of wage is newly introduced in Core Model MD83V1 and the equations of price sector are replaced with ones in which wage and rate of operation are the main independent variables.

(d) In the process of data estimation for Core Model MD83V1, we tried to clarify the mutual relation between government consumption (CG) and government investment (IG) in national income statistics and the government budget (Kosuge; Matsumoto 1986a). As a result, government revenue is calculated endogenously in the model. The range of estimation for an equation is normally from 1971 to 1984 or 1985. But for exports, this is from 1975 to 1984 or 1985; and for imports, from 1973 to 1984 or 1985, because of the data constraint. In spite of the short time-span of data, we had to introduce many dummy variables, partly to reflect the change of policies and partly to manage irregular fluctuations which seem to be caused by the low quality of the data. Therefore, we met a lot of difficulties in the process of estimation of coefficients for variables in searching for the most appropriate equations in terms of both statistics and economic theory. There have also been strange movement in deflators recent years, which affect the real values of GDP components. This added more difficulties to the estimation.

The main policy variables are as follows:

CG: Government consumption

IG: Government investment

RFEX: Foreign exchange rate

SMB: Money supply

The main objective variables are as follows:

Rate of growth: GDP, GDPR etc.

Rate of inflation: PGDP, PCP, PCPI etc.

Balance of payments, Financial balance, Foreign aids, Labour, etc.

Other main exogenous variables:

PWX: World export price index

MWR: World imports (real value)

QWOIL: Quantity of world petroleum production

PXOIL: Petroleum export price

N: population

## 2. System of Equations

Core Model MD83V1 consists of 33 structural equations and 22 identities. Each structural equation and some identities are explained here. The differences from Core Model-81 are specially noted.

### 2.1 Real Private Consumption (CPR)

$$CPR = -5203.67 + 0.15144 * (NNP - TXNOL) / PCP + 0.83235 * CPR_{t-1} + 4537.88 * PCP / PCP_{t-1}$$

(3.97)
(11.70)
(1.82)

$R^2 = 0.99642$       $D.W. = 2.97$      (1972-1984)

This is an equation of ordinary type explained by real disposable income and previous year's real private consumption. A speculative factor,  $PCP / PCP_{t-1}$ , has been added. Private consumption in the old series of national income statistics with base year 1973, which was used in the previous model, contained inventory; but these are separated in the new series with the base year 1983. Since, however, the inventory contains the statistical discrepancy between GDP and GDE, it is treated as an exogenous variable.

### 2.2 Real Private Capital Stock Formation (IPR)



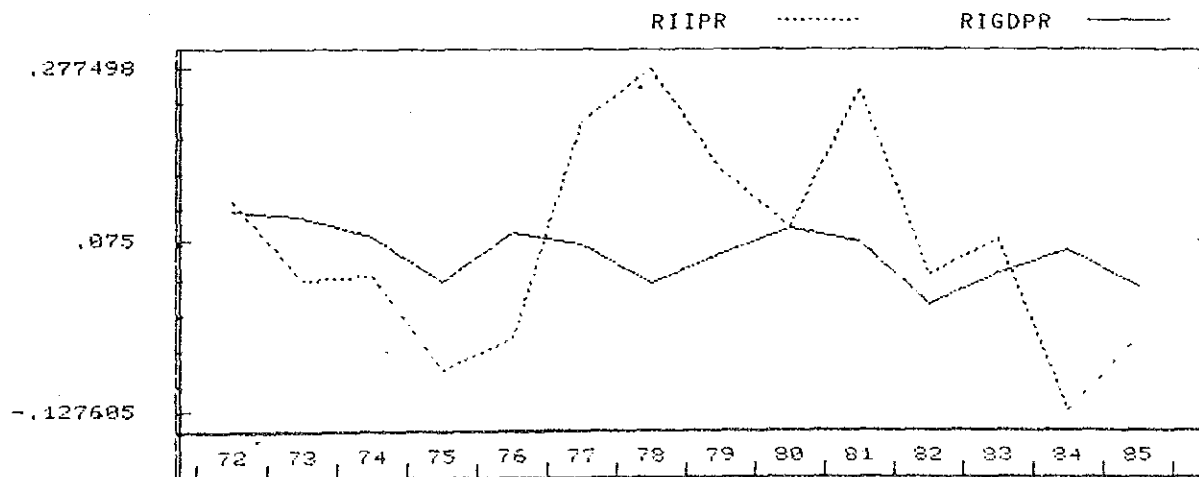
$$\begin{aligned}
 IPR = & -9128.24 + 0.33508 * (GDPR + GDP_{t-1}) / 2 - 0.24907 * (KPR_{t-1} + KPR_{t-2}) / 2 + 1.10129 \\
 & \quad (6.40) \quad (5.42) \quad (3.55) \\
 & * (SMB_{t-1} / PI_{t-1} + SMB_{t-2} / PI_{t-2}) / 2 + 4497.18 * PCSIV / PCSIV_{t-1} + 1991.03 * DUM83 \\
 & \quad (2.74) \quad (5.75) \\
 & - 1155.06 * DUM7577 \\
 & \quad (5.16) \\
 R^2 = & 0.99270 \quad D.W. = 3.60 \quad (1974-1984)
 \end{aligned}$$

$$PCSIV = (CP + CG + IP + IG) / (CPR + CGR + IPR + IGR)$$

This function is based on a stock adjustment principle and employs money supply and speculative factors. Average values for two consecutive years are used here because satisfactory results from the theoretical and statistical points of view could not be obtained with yearly data as explanatory variables. This reflects the doubtful quality of the data on the one hand and, on the other, the time-lag from the investors' recognition of the situation to action of investment. DUM7577 is a dummy variable showing the slump of investment due to the PERTAMINA crisis.

This investment function looks plausible in its shape and in the value of its parameter from theoretical and statistical points of view, and shows a satisfactory performance in the total interpolation test of the model. However, IPR actually shows big and irregular fluctuations in the projection with this model. This is one of the most serious problems of the model to be solved immediately.

Figure 1 Rates of Increase of IPR and GDP



Notes RIIPR : Rate of Increase of IPR  
RIGDPR: Rate of Increase of GDP

Since investment is not divided into private and government investments in the national income statistics of Indonesia, private investment is estimated by subtracting government investment, which we calculated from financial data, from fixed capital formation in the national income statistics. IG and IGR in the old model are estimated roughly and, therefore, they adversely affect the reliability of IP and IPR. Although we tried to improve the estimation of IG and

IGR, IP and IPR still show anomalous movements. Figure 1 shows the rate of increase of IPR and GDP over the previous year. IPR moves in the opposite direction to GDP from 1977 through 1981 and from 1984 through 1985. We do not know if this movement is due to error in the estimation of IPR or reflects the reality of the Indonesian economy. The stock adjustment mechanism seems to have an important relation with the cycle of IPR, according to the chosen equation here. As a result, IPR tends to have its own cycle, which is independent of the business cycle as a whole, even in the period of projection. The investment in petroleum and the related industries that account for a large share of the total private investment in Indonesia is decided by different factors from investment in the business cycle of the domestic economy and actually fluctuates a lot from year to year. Therefore, it is better to divide private investment into the investment in petroleum and related industries and other private investments. A task for the future is how to estimate such data.

## 2.3 Exports and Imports

### 2.3.1 Exports and Imports of Goods

$$\log(\text{XRFMD}) = 2.36221 - 0.0979583 \log(\text{PXP}_{t-1} / \text{RFEX}_{t-1} * 909.275) + 0.852521 \log(\text{MWR})$$

(2.50) (6.14)

$$+ 0.28593 \text{D7180} + 0.09459 \text{D7180}_{t-1}$$

(14.75) (5.26)

$$R^2 = 0.99530 \quad \text{D.W.} = 3.10 \quad (1977-1984)$$

$$\log(\text{XRFMD}) = 2.75027 + 1.78189 \log(\text{PW}/(\text{PXM}/\text{RFEX} * 909.275)) + 0.61943$$

(1.56) (2.80)

$$* \log(\text{XRFMD}_{t-1}) + 0.49897 \text{DAF83}$$

(1.48)

$$R^2 = 0.79334 \quad \text{D.W.} = 2.32 \quad (1976-1985)$$

$$\log(\text{MRFMD}) = -13.0587 - 0.63276 \log(\text{PMPMD} * \text{RFEX} / 909.275 / \text{PGDP})$$

(3.24)

$$+ 1.77773 \log(\text{GDPR} + \text{MR})$$

(10.16)

$$R^2 = 0.9666 \quad \text{D.W.} = 2.54 \quad (1973-1985)$$

$$\log(\text{MRMTD}) = -6.52067 - 0.55823 \log(\text{PMMTD}_{t-1} * \text{RFEX}_{t-1} / 909.275 / \text{PGDP}_{t-1}) + 1.34691$$

(2.96) (13.16)

$$* \log(\text{GDPR}_{t-1}) - 0.31666 \text{D79}$$

(5.16)

$$R^2 = 0.95547 \quad \text{D.W.} = 2.01 \quad (1974-1984)$$

$$\log(\text{MRFMD}) = 5.88295 - 0.14599 \log((\text{PMMFD} * \text{RFEX}) / (\text{PMMFD}_{t-1} * \text{RFEX}_{t-1})) + 0.25711$$

(1.42) (2.38)

$$* \log(\text{IPR}) - 0.07636 \text{D7577} + 0.21204 \text{D8183}$$

(1.35) (3.23)

$$R^2 = 0.95213 \quad \text{D.W.} = 1.99 \quad (1974-1983)$$

All structural equations for commodity exports and imports given here have statistically effective parameters of price factors. The price elasticity to exports is very low and that to imports is high in Core Model-81, while their movement is in the opposite direction in Core Model MD83V1. This latter result seems more reasonable, partly because the price indices of exports and imports are estimated only roughly in Core Model-81 and partly because of the observed nature of the Indonesian economy.

Non-oil-gas exports are estimated with one equation and the price elasticity is low, about 0.1, in Core Model-81, but they are divided into exports of primary goods and of manufactured goods in Core Model MD83V1, of which the former has a low price elasticity of nearly 0.1, while the latter shows a high value of about 1.8. The price elasticity to non-oil-gas exports is





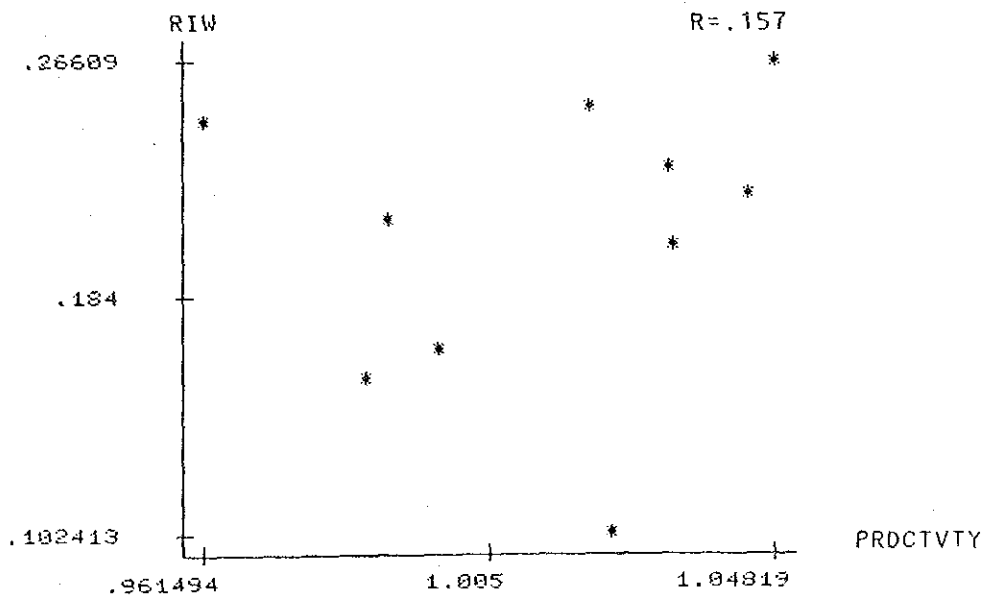
$$\begin{aligned}
 W/W_{t-1} = & -0.60190 + 0.85711 * PCP/PCP_{t-1} + 0.81735 * (GDPR/LABF)_{t-1} / (GDPR/LABF)_{t-1} \\
 & (3.30) \qquad \qquad \qquad (2.94) \\
 & + 0.11304 * D82 - 0.06624 * D84 \\
 & (4.65) \qquad (2.87) \\
 R^2 = & 0.88084 \quad D.W. = 1.74 \quad (1975-1984)
 \end{aligned}$$

Labour force is a simple function of population in Core Model-81, but the ratio of labour force to population is clearly increasing. Therefore, supply of labour is explained by a time trend and real wages in the new model.

Employment is shown as a simple function based on a stock adjustment principle. If this employment function is compared with the private fixed capital formation function discussed above, it is clear that the velocity of capital adjustment is faster than that of employment adjustment, which appears anomalous in view of the reality of the Indonesian labour market, where labour mobility is relatively high. We have already mentioned that the parameter of stock adjustment in the investment function is too large in terms of the stability of the model, but the quality of employment data might be questionable.

Wage is a new variable. We chose per capita labour cost in large and medium manufacturing companies as a representative wage. In the wage function, the rate of wage increase is determined by the rate of productivity and price increase. There also exists a short-circuit between wage and price, because wage is an explanatory variable of price functions, and this might make model MD83V1 unstable. To avoid this problem we tried to find another wage function using the rate of price increase in the previous year as a variable showing the expected rate of price increase in the year, but were unable to obtain a good fit.

Figure 2 Rates of Wage and Productivity Increases



Notes RIW : Rate of increase of W  
 PRDCTVTY: Labour Productivity

Figure 2 shows the relation between the rates of wage increase and productivity increase. They show positive correlation except at two points: the value in 1982 is extraordinarily high while that in 1984 is extraordinarily low. The reason is unknown. They are handled by a dummy variable in the equation.

The reliability of labour and wage data in Indonesia is questionable. These data need to be improved because of the expected exacerbation of the unemployment problem in this country.

## 2.6 Potential GDP

$$\text{GDPRT} = (0,9059 - 0,0249 * \text{TIME}) * \text{KR}_{t-1}$$

Potential GDP should be estimated by a production function consisting of capital and labour. It is, however, assumed to be expressible only by capital, because the reliability of labour supply data is low and unemployment data are not available. This may not be an unrealistic assumption because labour is not thought to be restrictive in Indonesia. Since the output-capital ratio has continuously decreased in the Indonesian economy, the function has a form such that the ratio at the time of full operation is estimated with a time-trend.

## 2.7 Deflators and Price Indices

$$\text{PCP} = -4,01018 + 0,60656 * \log(W) + 0,13253 * \log(\text{FM}) + 0,32448 * \log(\text{GDPRT}/\text{GDPRT})$$

(16,33)                      (2,54)                      (2,19)

$$R^2 = 0,99892 \quad \text{D.W.} = 2,54 \quad (1974-1984)$$

$$\log(\text{PCPI}) = -150,195 + 0,156554 * W + 50,2367 * \text{FM} + 194,968 * \text{GDPRT}/\text{GDPRT}$$

(5,55)                      (2,02)                      (3,69)

$$R^2 = 0,99292 \quad \text{D.W.} = 1,71 \quad (1975-1984)$$

$$\log(\text{PCG}) = -0,00271276 + 0,98978 * \log(\text{PCP})$$

(31,37)

$$R^2 = 0,99093 \quad \text{D.W.} = 1,95 \quad (1975-1984)$$

$$\text{PI} = -0,31525 + 0,000675774 * W + 0,34787 * \text{FM} + 0,47901 * \text{GDPRT}/\text{GDPRT}$$

(3,40)                      (1,90)                      (1,34)

$$R^2 = 0,98860 \quad \text{D.W.} = 2,14 \quad (1974-1984)$$

$$\text{PXPM} = -0,0660559 + 2,70040 * \log(\text{GDPRT}/\text{GDPRT}_{t-1}) + 1,11918 * \log(\text{PW} * \text{RFEX}/909,275)$$

(2,40)                      (17,86)

$$R^2 = 0,97259 \quad \text{D.W.} = 1,53 \quad (1975-1984)$$

$$\text{PXMF} = -3,75406 + 0,60343 * \log(W) + 1,93291 * \log(\text{GDPRT}/\text{GDPRT}) + 0,49393 * \log(\text{FM})$$

(2,20)                      (2,05)                      (1,37)

$$R^2 = 0,96863 \quad \text{D.W.} = 3,16 \quad (1975-1984)$$

$$\text{PX} = -0,05971 + 1,04879 * \text{PXCBMG} - 0,09834 * \text{D80}$$

(46,02)                      (3,53)

$$R^2 = 0,99302 \quad \text{D.W.} = 2,12 \quad (1975-1984)$$

$$\text{PXCBMG} = ((\text{XRFMD} * \text{PXFM} + \text{XRFMD} * \text{PXMF}) * 909,275 + (\text{QXOIL} * \text{PXOIL} + \text{QXGAS} * \text{PXGAS} * 17,8691) * \text{RFEX}) / ((\text{XRFMD} + \text{XRFMD} + \text{QXOIL} * 29,7834 + \text{QXGAS} * 17,8691) * 909,275)$$

$$\log(\text{FM}) = 0,02559 + 0,87025 * \log(\text{FMSIE})$$

(36,49)

$$R^2 = 0,99254 \quad \text{D.W.} = 1,17 \quad (1974-1984)$$

$$\text{FMSIE} = (\text{MRRICED} * \text{FMRICED} + \text{MROGD} * \text{FMROGD} + \text{MRPMD} * \text{FMRPMD} + \text{MRMTD} * \text{FMRMTD} + \text{MRMFD} * \text{FMRMFD}) * \text{RFEX} / 1000 / ((\text{MRRICED} + \text{MROGD} + \text{MRPMD} + \text{MRMTD} + \text{MRMFD}) * 909,275 / 1000)$$

The basic form of each deflator equation is such that the deflator is explained by wage, import price and the rate of operation of the macro economy. Whether an equation has a logarithmic linear or ordinary linear form depends on the estimation results. Although PCG is simply explained by PCP, it may be better to add such a datum as the wage of government

employees. The export price index of primary goods PXPM is related to world export price index PWX. Therefore, PXPM is expressed in terms of PWX and a demand factor. It should be noted that its elasticity to the import deflator is as high as about 0.5 in the equation of the export price index of manufactured goods.

PXOIL, PXGAS and import price indices FMPMD, FMMD, PMMFD, PMRICED and PMOGD are exogenous variables. Export and import deflators PX and FM are each calculated implicitly through the total of real and nominal values of their components.

## 2.8 Net Factor Income from Abroad

$$\begin{aligned} \text{NFIAD} &= 326.932 - 0.09706 * \text{ACBKL}_{t-1} - 178.206 * \text{RTBUS}_{t-1} \\ &\quad (8.11) \qquad (4.71) \\ R^2 &= 0.91541 \quad \text{D.W.} = 1.32 \quad (1971-1985) \\ \text{NFIA} &= \text{NFIAD} * \text{RFEX} / 1000 \end{aligned}$$

Net factor income from abroad in Indonesian statistics consists only of receipts and payments of interest, and does not count revenue of Indonesians abroad. This function is expressed as the accumulated net inflow of long-term capital ACBKL and T.B. rate of the United States. Both coefficients are negative because the value in the side of receives is shown as positive in NFIA. So far it has always been overpayment in Indonesia. T.B. rate, a short-term interest rate, is used as a representative international interest rate. ACBKL here is a simple accumulation of net inflows of long-term capital in the table of balance of payments since 1969. But it may be better to use the official data of accumulated debts including both long-term and short-term ones than our definition of ACBKL.

## 2.9 Depreciation

$$\begin{aligned} \text{DEPR/KR} &= -0.00611177 + 0.0615504 * \text{GDP} / (\text{KR}_{t-1} * \text{PI}) \\ &\quad (18.48) \\ R^2 &= 0.96323 \quad \text{D.W.} = 0.86 \quad (1971-1984) \\ \text{DEPPR/KPR} &= -0.0275048 + 0.0393596 * \text{GDP} / (\text{KPR}_{t-1} * \text{PI}) + 0.0237183 * \text{GDPR} / \text{GDPR}_{t-1} \\ &\quad (10.46) \qquad (2.38) \\ R^2 &= 0.90236 \quad \text{D.W.} = 0.70 \quad (1972-1984) \end{aligned}$$

Depreciation is expressed as capital stock, which is estimated at current price. The rate of GDPR growth is also added to the function of DEPPR. The rate is a variable showing the domestic economic condition. Although we tried another estimation with nominal capital stock, which corresponds to capital stock at book-keeping price, the result was far worse than that with the equations presented here.

## 2.10 Government Finance

### 2.10.1 Revenues

$$\begin{aligned} \text{TXOL} &= (-957.292 + 0.56816 * (\text{XOILD} + \text{XGASD}) + 0.23928 * (\text{XOILD}_{t-1} + \text{XGASD}_{t-1})) * \text{RFEX} / 1000 \\ &\quad (6.59) \qquad (2.87) \\ R^2 &= 0.98195 \quad \text{D.W.} = 2.38 \quad (1972-1984) \\ \text{TXNOL} &= -4.72834 + 0.68761 * \log(\text{GDP}) + 0.42652 * \log(\text{GDP}_{t-1}) \\ &\quad (3.63) \qquad (2.36) \\ R^2 &= 0.99562 \quad \text{D.W.} = 1.63 \quad (1972-1984) \\ \log(\text{TI}) &= -1.66083 + 0.84233 * \log(\text{GDP}) \\ &\quad (42.97) \\ R^2 &= 0.99300 \quad \text{D.W.} = 1.56 \quad (1971-1984) \end{aligned}$$

Oil and gas revenue is expressed as a function of their exports. More than a third depends on the exports of the previous year. TXNOL, the direct tax revenue excluding oil and gas revenue also depends a lot on the economic condition of the previous year. The elasticity of TXNOL to GDP is about 1.1, the total of the elasticities in the current and the previous years, which is not so high. The elasticity of indirect tax revenue (TI) to GDP is less than 1.

The Indonesian government fundamentally reformed the tax system in 1983, seeking a new finance system that was more free from oil and gas revenue and in order to expand the tax base at home. However, the effect of the new tax system emerges from 1984 or 1985, and is not well reflected in these equations. This is one of the serious effects in the new model which must be reestimated in order to improve the model year by year with newly added data.

## 2.10.2 Foreign Aid and Discrepancy

$$AIDERR = CG + IG + SB + RPEDB - TX TTL$$

AIDERR is calculated by subtracting the total of government revenue from the total of government expenditure. Since each term on the right-hand side of the above equation is defined by the concept of national income statistics, the concept is not perfectly consistent with that of the government budget from the Ministry of Finance. Since the Indonesian government maintains the principle of keeping a balanced budget at home, namely, that excess expenditure needs to be financed by borrowing from abroad, the excess expenditure means foreign aid or the amount needed to be borrowed from abroad. The data include statistical discrepancies because of the difference of concepts between national income statistics and the budget as stated above.

If they contain statistical discrepancies and nothing else, then they should average about zero, and AIDERR should be almost equivalent to foreign aid. However, the actual value has always been larger than that of foreign aid at any time in the past, by a factor of about 1.5. Although this shows that problems remain in the estimation, it may be a help to show the financial position of the government.

## 2.11 Balance of Payments

$$XBPD = 87.13480 + 0.98800 * XCBMGD + 1094.45000 * D7982$$

$$R^2 = 0.99822 \quad D.W. = 2.63 \quad (1975-1984)$$

$$XCBMGD = (XRFMD * PXP + XRMFD * PXM) / RFEX * 909.275 + XOILD + XGASD$$

$$MBPD = 963.51100 + 1.01878 * YMSIED + 1718.48000 * D7981$$

$$R^2 = 0.99573 \quad D.W. = 2.10 \quad (1974-1984)$$

$$YMSIED = MRFMD * PMPMD + MRRICED * PMRICED + MROGD * PMOGD + MRMTD * PMMTD + MRMFD * PMMFD$$

$$BCR = XBPD - MBPD - MRSNETD * PM / RFEX * 909.275 + NFIA / RFEX * 1000 + DUMNFIAD$$

$$BKLP = 3912.91 + 0.021869 * (GDP / RFEX + GDP_{t-1} / RFEX_{t-1}) * 1000 / 2 - 0.84164 * (ACBKLP_{t-1} + ACBKLP_{t-2}) / 2 - 2465.93 * (RFEX / RFEX_{t-1} + RFEX_{t-1} / RFEX_{t-2}) / 2 - 200.018 * RTBUS$$

$$-1617.12 * DUM75$$

$$R^2 = 0.70129 \quad D.W. = 0.74 \quad (1973-1985)$$

$$BBS = BCR + BKLP + BKLO$$

Current and basic balances are calculated endogenously in Core Model MD83V1. Commodity export and import in current balance are both expressed by approximate equations consisting of their components, which have already been discussed.



All the parameters have reasonable values of about 1. Current balance is obtained by subtracting net service import from the difference between exports and imports and, by definition, adding the net factor income from abroad. Net inflow of private long-term capital is substantially the only structural equation in this sector, and consists of stock adjustment principle and interest rate.

The coefficient of  $ACBKLP_{t-1}$  is as large as about 0.84 because it represents the total of the velocity of adjustment and the rate of repayment of the existing investment. The last variable but one represents the expectation of a change of exchange rate, and its sign is negative because foreign investors may hesitate to invest when they expect a fall in the value of rupiah. DUM75 is a dummy variable representing the PERTAMINA crisis. An alternative estimation using IP instead of GDP gave a better result than this equation. However, we rejected this because it is influenced by big fluctuations in IP, during the range of projection. The basic balance is the sum of the current balance and the balance of long-term capital.

### 3. List of variables (#: exogenous variable)

Core Model MD83V1 as a rule uses the same variable names as Core Model-81. This list contains only newly introduced variable names; names common to both models are listed in the previous chapter.

ACBKL : Accumulated Net Inflow of Long-Term Capital  
(Balance of Payments: B.P.)

ACBKLP : Accumulated Net Inflow of Private Long-Term Capital (B.P.)

AIDERR : Foreign Aid and Discrepancy (in Rp) (=CG+IG+SB+RPEDB-TXTTL)

BBS : Basic Balance (B.P.)

BCR : Current Balance (B.P.)

BKLO #: Net Inflow of Official Long-Term Capital (B.P.)

BKLP : Net Inflow of Private Long-Term Capital (B.P.)

BKLPK : Real Net Inflow of Private Long-Term Capital (B.P.)

DUMFIAD #: Dummy Variable to Adjusting for the Difference of in NFIA (in US\$)  
between B.P. and NI (national income statistics)

GDPPT : Potential GDP

J #: Inventory (nominal)

JR #: Inventory (real)

MBPD : Import (B.P., in US\$)

MRMFD : Real Import of Manufactured Goods excl. Machinery & Transport  
(in US\$)

MRMTD : Real Import of Machinery & Transport (in US\$)

MROGD #: Real Import of Oil, Gas & Related Products (in US\$)

MRPMD : Real Import of Primary Goods excl. Rice & Oil/Gas (in US\$)

MRRICED #: Real Import of Rice (in US\$)

MRSNETD : Real Import of Net Service (in US\$)

PDROL : Domestic Price of Oil

PFDD : Deflator of Final Domestic Demand

FMMFD #: Deflator of MRMFD

FMMTD #: Deflator of MRMTD

FMOGD #: Deflator of MROGD

FMPMD #: Deflator of MRPMD

FMRICED #: Deflator of MRRICED

PXMF : Deflator of XRMFD

PXPM : Deflator of XRPMD

RPEDB #: Repayment of External Debt (in Rp)  
 RTBUS #: US T/B Rate  
 SB #: Subsidy (nominal)  
 SMB #: Money Supply (broad money: M2)  
 TXTTL : Tax Total  
 W : Wage  
 XBPD : Export (B.P., in US\$)  
 XFMFD : Real Export of Manufactured Goods (in US\$)  
 XRPMD : Real Export of Primary Goods (in US\$)

#### IV. MULTIPLIER ANALYSIS

Multiplier analysis by MD83V1 is a tool for analyzing changes in the solution of endogenous variables when the values of exogenous variables are changed, and therefore to indicate the influence of changes of policy on the macro economy.

Three cases of multiplier analysis are examined in comparison with the standard case of extrapolative simulation (projection) for the period of 1985 through 1989, by changing IG, RFEX and PXOIL with the same value during the period. The results are given in the multipliers tables at the end of this section.

##### 1. Increase of IG (Government Expenditures)

An increase of Rp.1,000 billion in IG causes GDPGR to increase by more than Rp. 600 billion, that is, an increase of 0.78%, in the first year. This gives a ratio of the increase of GDPGR to that of IGR of 0.772, which is almost equal to the value in the second year, and which is the largest multiplier of IG in the old model.

The multiplier effect on GDPGR is in any case far lower than 1, mainly because the demand elasticity of imports is very high in Indonesia. The elasticity of GDPGR to IGR drops a little in the second year and turns upward from the third year, reaching its highest value of 1.2 in the fifth year, the last year of the period of simulation. This result shows that the model might tend to be expansive to change from the outside. If this is so, this is a serious defect in the model for long-term projection but probably less serious for short- and medium-term projection like this. The effect on CPR growing larger year by year is because of the change of GDPGR and the gradual and accumulated effect of  $CPR_{t-1}$ , an explanatory variable of the CPR function. The effect on IPR is positive in the first year but negative in the third year. This may be because the stock adjustment effect works too strongly. This result shows the need to improve the model.

The increase of domestic demand clearly makes the current balance worse, to the extent of about US\$ 300 million in the second years if IG increases by Rp. 1,000 billion. To see the effect on price, we must look at PGDP, which increases by about 1.3% in the first year but by less in the second year and after.

##### 2. Devaluation

RFEX is assumed to increase by Rp. 100/US\$ every year during the period of analysis. RPEDB and PDROL are changed according to the change of RFEX, because external debt repayment RPEDB is committed in terms of foreign exchange and the domestic oil price will change if the exchange rate changes.

The devaluation of RFEX affects import restriction more than export expansion in real terms. This is explained as follows: The elasticity of price to each component of imports is not very high, but each import is elastic to the relative price, while the price elasticity to the exports of manufactured goods is high but their share in total exports is small, the main export items being primary goods and oil and gas, which are not elastic to price. However, the total

effect of the increase of exports and the decrease of imports is significant; and it peaks in the third and/or the fourth year. Current balance is also radically improved, by about US\$ 370 million in the first year and about US\$ 750 million in both the third and the fourth years. But the effect on GDPR is the biggest in the first year, when the growth rate is pushed up by 0.52% because the effect of the increase of exports and the decrease of imports covers the decrease of government expenditures caused by inflation in real terms; but the effect on GDPR is suddenly reduced, mainly owing to the decrease of IPR, in the second year and becomes negative in the third year. Although the effect on GDPR becomes positive in the fourth and the fifth years, it is small. The decrease of IPR might be affected by its fluctuation, mentioned above, besides the effect of inflation of making real money supply small.

Since each deflator and price index is sensitive to import price, devaluation influences prices appreciably. PGDP, PCP, and PCPI are pushed up by 3.7%, 2.9%, and 4.3% respectively in the first year, but from the second year the influences are not significantly different from the standard case. Why the effect on PX is so severe, an increase of 9.6%, in the first year is that the export price of oil in rupiah increases by the same ratio as devaluation. Therefore, the big increase does not have any actual meaning.

The financial position of the government is improved appreciably. TXTTL increases by about Rp. 1,200 billion in the first year from the jump in oil and gas revenue and the increase of domestic revenue due to the nominal expansion of GDP.

As a result, AIDERR decreases more than Rp. 800 billion even if the increase of RPEDB in rupiah terms is considered.

### 3. Increase of PXOIL (Export Price of Oil)

The high price of oil greatly improves the current balance and the financial position of the government. The increase of PXOIL by US\$ 5/bl improves Indonesia's current balance by US\$ 2.3 billion in the first year and yields significant improvements in the second year and after. Tax revenue increases by 1,700 and about 2,600 billion rupiah respectively in the first and second years. The reason for the enormous increase in the second year is that the oil revenue depends on the export of the previous year, and the reason for the continued increase in and after the third year is that the rupiah is assumed to devalue steadily in both this case and the standard case. Therefore, this increase is not due to the nature of the model.

The increase of oil price does not greatly influence GDPR because the quantity of exported oil does not change, even though the nominal value of export increases a lot. On the other hand, non-oil-gas exports decrease slightly because of the increase of the domestic price and because demand for neither of them expands significantly. As a result, the total export decreases a little in real terms. Real income expands because GDP increases by the nominal expansion of exports, while domestic prices, for example, PCP, do not inflate so much. Therefore, real private consumption increases.

The effect of the increase oil price to expand the Indonesian economy owing to the improvement of terms of trade by the increase of the oil price. Since, however, imports also increase, the increase of GDPR is about 0.3% in terms of growth rate in the first year.

It should be noted that this multiplier analysis involves changing only PXOIL, PXGAS and PDROL, of which the latter two are directly related to the first. Since the Indonesian government employs the principle of maintaining a balanced budget, if oil revenue increases, then government expenditure must also increase. The effect of expansion on the macro economy may then be larger than this case, because the multiplier effect of the increase of government expenditure is added to that of the increase of PXOIL.

Table 1 Multiplier Table of Case (1): Increase of IG (Government Expenditure)

IG + 1000 BL.RP.			1985	1986	1987	1988	1989
CPR	(REAL PRIV. CONSUMP.)	B.RP	144.3	143.1	155.7	205.3	252.6
CGR	(REAL GOV. CONSUMP.)	B.RP	-99.6	-46.4	-18.2	-20.4	-17.5
IPR	(REAL PRIV. F.C.F.)	B.RP	157.8	4.8	-96.6	39.2	95.8
IGR	(REAL GOV. F.C.F.)	B.RP	791.7	759.7	661.8	574.5	506.0
XR	(REAL EXPORT)	B.RP	-111.3	-141.3	-110.2	-59.0	4.3
MR	(REAL IMPORT)	B.RP	272.0	272.6	175.4	212.6	255.9
GDPR	(REAL GRS.DOMS.PRODUCT)	B.RP	610.8	447.3	417.1	527.1	585.4
CP	(NOMINAL PRIV. CONSUMP.)	B.RP	834.4	527.0	402.4	567.6	679.8
IP	(NOMINAL PRIV. F.C.P.)	B.RP	325.2	93.4	-85.8	150.7	278.8
X	(NOMINAL EXPORT)	B.RP	14.1	-194.3	-201.5	-116.6	-30.8
M	(NOMINAL IMPORT)	B.RP	321.8	375.0	289.9	379.0	500.5
GDP	(NOMINAL GRS.DOMS.PRDCT)	B.RP	1851.9	1051.1	825.3	1222.7	1427.3
XBPD	(EXPORT BP.)	M.\$	-1.7	-145.3	-119.8	-65.3	-16.2
MBPD	(IMPORT BP.)	M.\$	49.9	122.0	65.6	68.1	92.9
BCR	(CURRENT BALANCE BP.)	M.\$	-152.9	-336.7	-235.0	-197.9	-185.0
BBS	(BASIC BALANCE BP.)	M.\$	-134.4	-317.2	-244.4	-212.8	-186.8
PCPI	(CONSUMERS PRICE IDX 83=100)		1.6	-1.0	-.5	.0	-.1
PCP	(PRIV CONSM DEFLTR 83=1)		.013	-.007	-.003	.001	.000
PI	(FXD CAP FORM DEFLTR =1)		.012	-.006	-.004	.001	.000
PX	(EXPORT DEFLATOR =1)		.006	-.008	.002	.003	-.001
PM	(IMPORT DEFLATOR =1)		.000	.001	-.001	.000	.000
PGDP	(GRS DOMS PROD DFLTR =1)		.013	-.006	-.003	.001	.000
PFDD	(GRS DOMS DEMD DFLTR =1)		.011	-.006	-.002	.001	.000
IG	(NOMINAL GOV. F.C.F.)	B.RP	1000.0	1000.0	1000.0	1000.0	1000.0
TXTTL	(TOTAL GOV. REVENUE)	B.RP	88.4	77.2	55.2	70.2	86.3
AIDERR	(FORGN AID & DISCRPNY)	B.RP	911.6	922.8	944.8	929.8	913.7

Note: This is the table of differences induced by subtracting the values of the standard case from the values of the case of IG increase.

Table 2 Multiplier Table of Case (2): Devaluation

RFEX + 100 RP/US\$			1985	1986	1987	1988	1989
CPR	(REAL PRIV. CONSUMP)	B.RP	224.4	146.1	96.3	160.6	174.9
CGR	(REAL GOV. CONSUMP)	B.RP	-227.8	-158.9	-99.0	-133.7	-137.4
IPR	(REAL PRIV. F.C.F.)	B.RP	214.7	-448.7	-900.7	-568.3	-413.6
IGR	(REAL GOV. F.C.F.)	B.RP	-214.7	-179.7	-112.0	-121.8	-120.4
XR	(REAL EXPORT)	B.RP	120.6	267.5	432.6	364.8	232.8
MR	(REAL IMPORT)	B.RP	-351.5	-533.2	-541.9	-421.0	-358.0
GDPR	(REAL GRS. DOMS. PRODUCT)	B.RP	408.8	159.5	-40.8	122.5	94.3
CP	(NOMINAL PRIV. CONSUMP.)	B.RP	1815.1	1406.0	1178.0	1921.8	2273.8
IP	(NOMINAL PRIV. F.C.P.)	B.RP	799.5	-61.0	-816.4	-237.3	28.0
X	(NOMINAL EXPORT)	B.RP	2235.3	1575.2	1984.5	2573.3	2548.2
M	(NOMINAL IMPORT)	B.RP	1048.0	625.1	348.1	613.7	818.6
GDP	(NOMINAL GRS. DOMS. PRDCT)	B.RP	3801.9	2295.1	1998.0	3644.1	4031.3
XBPD	(EXPORT BD.)	M,\$	147.2	289.2	333.7	420.2	302.5
MBPD	(IMPORT BP.)	M,\$	-77.5	-217.3	-250.8	-204.4	-157.0
BCR	(CURRENT BALANCE BP.)	M,\$	368.2	578.2	753.1	752.0	571.2
BBS	(BASIC BALANCE BP.)	M,\$	202.8	460.6	911.2	894.9	576.6
PCPI	(CONSM PRICE IDX 83 =100)		4.3	-1.2	-.8	.6	-.1
PCP	(PRIV CONSUM DFLTR 83=1)		.029	-.009	-.006	.006	.001
PI	(FXD CAP FORM DFLTR =1)		.046	-.011	-.009	.004	-.001
PX	(EXPORT DEFLATOR =1)		.096	-.011	-.023	.001	-.005
PM	(IMPORT DEFLATOR =1)		.079	-.013	-.015	-.002	-.002
PGDP	(GRS DOMS PROD DFLTR =1)		.037	-.012	-.004	.008	.000
PFDD	(GRS DOMS DEMD DFLTR =1)		.031	-.008	-.006	.005	.000
TX TTL	(TOTAL GOV. REVENUE)	B.RP	1176.1	718.0	521.2	752.6	946.4
TXOL	(OIL/LNG REVENUE)	B.RP	995.0	552.8	391.5	551.0	699.7
RPEDB	(EXTRNL DEBT REPAYMENT)	B.RP	367.0	300.0	372.0	450.0	492.0
AIDERR	(FORGN AID & DISCRPNY)	B.RP	-809.1	-418.0	-149.2	-302.6	-454.4
RFEX	(FORG. EXCHANGE RATE)	RP/&	100.0	100.0	100.0	100.0	100.0
PDROL			22.4	11.2	12.6	16.7	16.9

Note: This is the table of differences induced by subtracting the value of the standard case from the value of devaluation.

Table 3 Multiplier Table of Case (3): Increase of PXOIL (Export Oil Price)

PXOIL + 5 US\$/BL			1985	1986	1987	1988	1989
CPR	(REAL PRIV. CONSUMP.)	B,RP	412.5	727.9	993.8	1213.9	1405.5
CGR	(REAL GOV. CONSUMP.)	B,RP	-36.5	-49.5	-56.1	-62.6	-70.4
IPR	(REAL PRIV. F.C.F.)	B,RP	57.2	51.6	13.0	-11.2	-21.5
IGR	(REAL GOV. F.C.F.)	B,RP	-27.0	-33.4	-34.3	-36.3	-40.7
XR	(REAL EXPORT)	B,RP	-41.1	-108.4	-222.1	-321.6	-394.3
MR	(REAL IMPORT)	B,RP	140.6	319.3	338.8	378.7	429.2
GDPR	(REAL GRS. DOMS. PRODUCT)	B,RP	224.6	269.0	355.5	403.6	449.5
CP	(NOMINAL PRIV. CONSUMP.)	B,RP	705.2	1260.4	1954.2	2657.0	3427.3
IP	(NOMINAL PRIV. F.C.P.)	B,RP	117.0	159.8	184.8	200.7	238.4
X	(NOMINAL EXPORT)	B,RP	2993.6	3043.2	3251.5	3511.0	3811.4
M	(NOMINAL IMPORT)	B,RP	162.8	442.4	568.9	683.5	843.0
GDP	(NOMINAL GRS. DOMS. PRDCT)	B,RP	3652.9	4021.0	4821.6	5685.2	6634.1
XBPD	(EXPORT BP.)	M.\$	2409.7	2113.6	1838.1	1915.7	2006.6
MBPD	(IMPORT BP.)	M.\$	48.3	188.8	187.2	198.0	222.5
BCR	(CURRENT BALANCE BP.)	M.\$	2321.9	1863.4	1576.4	1628.2	1679.7
BBS	(BASIC BALANCE BP.)	M.\$	2358.3	1918.2	1588.5	1613.8	1672.7
PCPI	(CONSM PRICE IDX 83=100)		.6	.2	.2	.1	.1
PCP	(PRIV CONSM DEFLTR 83=1)		.005	.002	.003	.001	.0010
PI	(FXD CAP FORM DFLTR =1)		.004	.003	.002	.001	.001
PX	(EXPORT DEFLATOR =1)		.029	.037	-.228	-.151	.006
PM	(IMPORT DEFLATOR =1)		.000	.002	.000	.000	.000
PGDP	(GRS DOMS PROD DFLTR =1)		.038	.002	.000	-.001	.001
PFDD	(GRS DOMS DEMD DFLTR =1)		.004	.001	.002	.001	.001
TX TTL	(TOTAL GOV REVENUE)	B,RP	1695.9	2644.8	3038.0	3392.1	3955.2
TX OIL	(OIL/LNG REVENUE)	B,RP	1521.9	2398.1	2748.8	3049.9	3554.3
AIDERR	(FORGN AID & DISCRPNCY)	B,RP	-1695	-2644	-3037	-3392	-3955
PX OIL	(OIL EXPORT PRICE)	\$/BL	5.000	5.000	5.000	5.000	5.000
PX GAS			.186	.186	.185	.184	.178
PDROL			46.4	55.2	69.6	74.7	79.9

Note: This is the table of differences induced by subtracting the value of the standard case from the value of the case of PXOIL increase.

## V. CONCLUDING REMARKS

There are still a lot of defects in Core Model MD83VI, as pointed out above. As in Core Model-81, many of them are due mainly to the incompleteness of data.

(1) In particular, unstable movements of private investment affect the total system of the model in various ways.

(2) The reliability of data on labour and related items used in the model is rather low, even though such data are very important in the Indonesian economy.

(3) The financial data still have problems. The estimated equations representing tax revenue do not reflect the effect of the recent tax reform, although this is impossible at present because of the nature of time-series analysis.

(4) It is necessary to improve the equations representing prices to more properly represent government-controlled prices and the oil price.

(5) It is necessary to make the oil sector more explicit in the model. The relation between the movements of the oil market and the domestic economy is expressed as a simple multiplier effect from the change in exports to the macro economy in the present model. Since this is too simple to represent the complicated relation that actually exists between the oil market and the domestic economy, this sector must be made more sophisticated and explicit because it is really important to Indonesia.

However, it may be said that, for the economic projection, this model is compact and practical enough to account for sufficient economic indicators and political goals, such as components of GDP, labour, prices, balance of payments, and government account, in spite of these defects.

It is important, on one hand, to try to enlarge the field of application of the model by pursuing necessary disaggregated submodels or by developing a submodels; and, on the other, to make continuous efforts to improve the model while keeping the workability of its core. The best way to develop and improve a model is to continually repeat simulations for policy planning and to feed back the problems and experiences from this process into the model.

## REFERENCES

- BPS(Biro Pusat Statistik). 1975-1984. Produksi Indonesia. Jakarta.
- Kosuge, N. & Matsumoto, Y. 1986a. The Estimation of National Income Statistics -- the Government Sector --. BAPPENAS. (mimeo)
- , 1986b. The Estimation of National Income Statistics -- the New Series --. BAPPENAS. (mimeo)
- , 1986c. Price Index of Import and Export. BAPPENAS. (mimeo)
- , 1986d. Price Index of Import and Export in 1985 -- Supplement for D.C.S. No.40. BAPPENAS. (mimeo)
- Kuribayashi, S. 1987. "A Medium-term Macroeconometric Model for Economic planning in Indonesia. Southeast Asian Studies. vol.24. Kyoto University.
- Matsumoto, Y. & Kosuge, N. 1986. The Estimation of National Income Statistics: GNPR and NNPR. BAPPENAS. (mimeo)





CHAPTER IV  
AGRICULTURAL DEVELOPMENT

Jonker L. Tamba  
Bureau Chief, Data and Information, BAPPENAS, Indonesia

Hiroyuki Nishimura  
Department of Agriculture, Kyoto University, Japan



## I. INTRODUCTION

Agricultural development policy in Indonesia can be traced back to 1951 when the so-called "Economic Emergency Plan" was launched. Basically the plan tried to improve the general economic condition worsened by World War II and the struggle for independence. The main objective was to reactivate productive capacities to return national production to the pre-war level. The agriculture-based economy put strong emphasis in agricultural export commodities which were the main source of foreign exchange earnings. Coincidentally, the Korean War has increased demand for agricultural products which stimulated domestic production, especially of rubber and coffee.

In addition to the positive effects from the so-called "Korean Boom", some ill effects could be observed. In rubber production, for instance, having been deprived of basic needs for a long period, farmers tried to tap more rubber than technically advisable. At the very peak of foreign demand agro-technical considerations were almost totally neglected. Lack of qualified field personnel at government offices to provide farmers with the necessary knowledge intensified long-term losses. Meanwhile, the newly achieved independence tended to push the middle and upper classes into more political activities than economic ones. Scarcity of qualified technical people in almost all fields was another constraint.

Rice production gains were also far less than expected. Although government's efforts should be some credit, only a meager increase was observed during the period which was partly explained to be because of the elasticity of demand caused by a postwar baby boom.

Limited investment funds further constrained by an overly political orientation in economic management did not give the Economic Emergency Plan much opportunity to succeed.

One good lesson, which was learned the hard way, was acknowledged. It was then realized that planning could not be accomplished by an ad hoc committee or temporary organization of any type. Planners need to have formal status with sufficient authority and clearly defined job descriptions and responsibilities. This led the government to establish the Planning Bureau in 1956, which managed to formulate the First Five Year Plan covering the period 1956 - 1960. For the first time the economy was given formal attention and agriculture was relied upon to finance development of other sectors.

The implementation of the plan was quite hampered by political uprisings in the country, and, as could be guessed, results were minimal. In 1959 it was obvious that the plan could not be implemented fully. Meanwhile, rice imports levels had reached worrying amounts of around half a million tons per annum; even greater imports seemed likely. To cope with the problem a three-year program was launched to increase rice production. In Java where most rice was produced, paddy centers were established. The main objective was to increase productivity by providing better irrigation and the necessary inputs. The result of the program was less than expected.

In 1961, the Bureau commenced another plan for an eight-year period. That plan was never actually implemented. Spiraling inflation and unemployment were at their peak, while the political situation worsened dramatically which ended up in the abortive coup of the communist party in 1965.

When the New Order took over in 1965, most efforts were directed towards stabilizing the political conditions and bringing the economy under control. Within several years the main obstacles to launching serious economic development programs were solved, and in 1969 the First Five Year Plan was started.

Agricultural development was given high priority in the general development framework Repelita I. This sector was at a low point, as was also true for the rest of the economy. In the production sector, lack of necessary inputs, maintenance, and other overhead facilities were serious. Agricultural exports had been decreasing as a consequence of negligence in economic affairs during the old regime. This brought serious problems in foreign exchange earnings.

Besides stabilizing the political conditions, efforts were directed towards rehabilitation of productive capacities in all sectors. The agricultural sector was given special attention. Provision of the necessary inputs and rehabilitation of production capacities were early

priorities. At the same time the issue of rice self-sufficiency was treated seriously. New high yielding rice varieties, e.g., IR-5 and IR-8, were introduced and existing overhead facilities, especially irrigation, repaired, maintained or expanded.

This report is focuses on food production and export-related subsectors. Animal husbandry and forestry are also discussed as well.

## II. THE ROLE OF AGRICULTURE IN INDONESIA'S ECONOMY

The role of agriculture in a nation can be observed from its share to the Gross Domestic Product. Below are the sectorial relative shares in GDP for selected years.

Table 1 Gross Domestic Product by Main Sectors in Selected Years  
(Rp. billion, at constant 1973 prices)

Sector	1969	1974	1979	1984
Agriculture	2263.0	2281.0	3255.6	4083.3
Mining	452.0	859.0	1046.9	1023.6
Industry	399.0	755.0	1395.3	2089.4
Electricity etc.	19.6	37.0	68.6	125.8
Construction	114.0	320.0	562.8	792.4
Transport/Comm.	158.0	228.0	559.8	816.6
Other Services	1414.9	2199.0	3275.9	2332.5
GDP	4820.5	7269.0	10164.2	13506.0

Source : Central Bureau of Statistics,  
National Income Statistics, various issues.

Note that the share of agriculture in GDP diminished from 46.95% in 1969 to 39.63% in 1974, to 32.03% in 1979 and to 30.23% in 1984.

The growth rates, however, show increases during the study period. During Repelita I, Agriculture value added increased by an average of a meager .16%, but in the following Repelitas growth was 7.37% and 4.63%, respectively.

This study aims to analyze the achievements which have enabled the relatively "good" performance. As observed later, performance may not be as rosy as it appears. Several fundamental issues have appeared during the process, while other problems have arisen as consequences of the policies.

The next section will deal with sub-sectoral value added and production, policy decisions and problems. It will further analyze the relation with the general development performance and issues. The following section will concentrate on future problems and related policy decisions. Finally, alternative policy recommendations will be proposed, either to modify or supplement existing policies.

## III. SUB-SECTORAL VALUE ADDED AND PRODUCTION

The statistical break-down of the agricultural sector is based on the practice followed by the Central Bureau of Statistics in estimating the sector's value added and hence its production.

The following table shows the value added of each sub-sector in selected years.

Table 2 Agricultural Value Added of Agriculture by Sub-sectors in Selected Years  
(Rp. billion, at 1973 constant prices)

Sub-Sector	1969	1974	1979	1984
Farm food crops	1373.1	1681.0	1908.8	2618.6
Farm non-food crops	299.5	307.0	402.1	495.2
Estate crops	146.7	174.0	231.1	301.5
Livestocks & products	147.6	186.0	201.6	253.1
Forestry	168.3	325.0	337.7	185.5
Fishery	128.2	138.0	174.3	229.4

Source : Central Bureau of Statistics, various issues.

All sub-sectors have shown positive growth rates, although with significant variations in their absolute rates. Labelling the periods between 1969-1974, 1974-1979 and 1979-1984 are Periods I, II and III respectively, the implicit growth rates for each sub-sector are as follows:

Table 3 Growth rates of Agricultural Value Added by Sub-sector (Constant 1973 prices) (%)

Sub-Sector	Period I	Period II	Period III
Farm food crops	4.13	2.57	6.28
Farm non-food crops	.50	5.49	5.55
Estate crops	3.47	5.84	5.46
Livestock	4.73	1.62	4.66
Forestry	14.07	.77	- 11.29
Fishery	1.15	4.78	5.65

Source : Derived from Table 2.

In Period I, which more or less covers the period of Repelita I, almost all efforts in agriculture were directed towards rehabilitation of existing production capacities. This is especially true for farm food crops primarily rice. The increasing volume of imported rice was a warning about the need for serious efforts to increase domestic production. Besides revenues from oil, Indonesia also depends on traditional commodities produced by small holders', as well as medium- and large-scale plantations to finance the necessary imports. Traditional commodities include coffee, rubber, copra, etc. It was therefore of utmost importance, in the beginning of Repelita I that production capacities be rehabilitated.

In other agricultural sub-sectors conditions were more or less similar with regard to production capacities. These sub-sectors gained significant importance in subsequent Repelitas.

#### IV. FOOD PRODUCTION

Farm food commodities include rice, cassava, sweet potatoes, etc. Table 4 shows the production of major commodities at the starting years of the four consecutive Repelitas undergone hitherto.

Table 4 Farm Food Production in Selected Years  
(1000 tons)

Commodity	1969	1974	1979	1984
Rice :	23756	22464	26283	38136
- wet land	21474	21053	24731	36017
- dry land	2282	1411	1552	2119
Maize	2293	3011	3606	5359
Cassava	10917	13031	13751	14205
Sweet potatoes	2260	2469	2194	2305
Peanuts	267	307	424	522
Soy beans	389	589	680	743

Source : CBS, Jakarta, Various Publications.

Again these figures more or less cover the corresponding periods of Repelita I, II and III. For the sake of consistency the periods will be labeled Period I, II and III as before. Table 5 below shows the production growth rate of each commodity.

Table 5 Growth Rates of Farm Food Production  
(Average % per annum)

Commodity	Period I	Period II	Period III
Rice :	-1.11	3.19	7.73
- wet land	-0.40	3.27	7.81
- dry land	-9.17	1.92	6.43
Maize	5.60	3.67	8.25
Cassava	3.61	1.08	0.65
Sweet potatoes	1.78	-2.33	0.99
Peanuts	2.83	6.68	4.24
Soy beans	8.66	0.91	0.46

Source : Derived from Table 4

Most growth rates in Period I were positive. This is consistent with aforementioned policy to rehabilitate existing capacities. Production of rice, however, was negative. As will be analyzed later, the rice problem brought about a very strong determination to launch the self-sufficiency program.

Except for maize and soybeans, growth rates for commodities were relatively low, underscoring

the seriousness of the condition of food production in the period.

In Period II, however, efforts made during Period I started showing positive results. Growth rates were relatively higher, especially for rice. It is worth noting that sweet potatoes had negative rates. This was due to the substitution effect caused by increased production of rice. When supplies of rice are short and price increases occur, low income groups shift to inferior quality products, e.g., maize, cassava, sweet potatoes, etc. But as soon as rice becomes available at reasonable prices, consumption shifts towards rice almost instantaneously.

## Rice

Rice production increased around 3.2% per annum for wet land and around 2% for dry land cultivation.

Rice production had been inadequate for quite some time, and the annual volumes imported to balance the domestic shortage were increasing. Projections of rice imports demonstrated that serious efforts to increase rice production could not be delayed any longer. Below are the figures for rice imports:

Table 6 Rice Imports of Indonesia  
in Selected Years

Year	Volume (1000 Ton)	Value (Mill.US\$)
1969	238	45
1973	1.863	302
1978	1.842	592
1980	2.012	690
1981	538	207
1984	321	105

Source : CBS, Various Import  
Statistics

The most critical period in the drive for rice self-sufficiency was between 1973 and 1980. This coincides with Repelita II and part of Repelita III. With Repelita II new areas were opened. The transmigration program, which was originally designed to solve problems regarding distribution of population, became linked to the rice program. Coming from rice producing areas, these transmigrants were considered to be an able vehicle for carrying out the ambitious program.

It was very fortunate that no devastating financial problems were encountered. Oil price hikes benefited Indonesia starting in 1973.

The expansion of harvested area for rice cultivation can be seen from the following Table 7.

Table 7 Harvested Area of Rice Cultivation (1000 Ha)

Year	Wet Land	Dry Land	Total
1969	6,544	1,470	8,014
1974	7,340	1,168	8,508
1979	7,675	1,128	8,803
1984	8,547	1,216	9,763

Source : CBS, Various Publications.

Above figures show that harvested area increased only by 1.2%, 0.7% and 2.1% in the three consecutive periods. The opening of new areas on islands besides Java proved to be time consuming. Lack, or in many cases absence, of the necessary infrastructure, such as roads etc, was the major reason. In several locations, it was necessary to construct airstrips since they proved to be cheaper and more effective in transporting people from Java. It is also worth remembering that newly opened rice fields may not be productive in the initial years for purely technical reasons.

Figures from Table 4 and Table 7 provide the change in production per Ha over time.

Table 8 Production per Ha of Rice Cultivation in Selected Years (100 Kg)

Year	Wet Land	Dry Land	Average
1969	32.82	15.53	29.64
1974	28.68	12.08	26.40
1979	32.22	12.60	29.85
1984	42.14	17.42	39.06

Source : Derived from preceding Tables.

Productivity per Ha decreased during Period I. This was partly due to the fact that rehabilitation of facilities was not entirely completed, especially in production centers located outside Java. Efforts at some production sites were delayed until roads were passable. However, in Java where facilities were in relatively better condition, introduction of the new varieties and application of fertilizer and pesticides resulted in an average production increase of about 4.7% during the period.

After viewing at the results obtained in Java, the strive towards rice self-sufficiency was expanded over the whole country, and existing programs widened to cover the entire range of food production. The last objective might have been too ambitious since rice problems had not yet been solved and were still amongst the most serious national concerns. Therefore, although the plan mentioned a strong political determination to realize food self-sufficiency, efforts were concentrated in increasing rice production.

In Period II, however, rehabilitation of existing capacities, expansion of rice fields, introduction of new techniques and seeds, and application of fertilizer and pesticides not only managed to increase the harvested acreage, but also improved productivity per Ha. The Central Research Institute of Agriculture in Bogor established branches at production centers throughout



the country which helped improve local conditions and solve specific farming problems.

Efforts were continued and intensified in Period III. The average growth rate over both periods for wet-land, dry-land and total rice production per Ha were 3.9%, 3.7% and 4.0% per annum.

During the course of time, production cost structure has also changed. The following table reveals the major cost items in 1979 and 1983 for which information exists.

Table 9 Cost Structure of Paddy Production in Indonesia, 1979 and 1983 (%)

Cost Item	% of Cost Item to Total Cost		% of Cost Item to Value of Prod.	
	1979	1983	1979	1983
1. Seed	7.45	5.68	1.68	1.64
2. Pesticide	2.17	2.42	0.49	0.70
3. Fertilizer	16.76	14.36	3.77	4.16
4. Agr. Animal/ Implements	7.98	7.18	1.80	2.08
5. Irrigation	1.43	1.51	0.32	0.44
6. Wages/Salaries	55.87	60.53	12.59	17.53
7. Other Costs	8.34	8.32	1.88	2.40
Total	100.00	100.00	22.53	28.95

Source : CBS, Cost Structure of Agricultural Commodities, 1979, 1983.

As seen above, total cost of production increased from 22.53% of total value of production in 1979 to 28.95% in 1983. Farmers spent more for every cost item in percentage terms, except seeds which are relatively stable. Cost of manpower as well as agricultural animals -- still widely used for plowing and transportation -- are the components that constitute the highest categories in the cost structure.

Wages alone were over 60% of the total production cost in 1983 and experienced the highest percentage increase during the time span. This could be an indication of less manpower in farm areas. This is partly due to the transmigration scheme that reduced the number of village/agricultural laborers, and also by urbanization. It is not surprising, therefore, to expect farm wages to move slowly upward. This phenomenon is even more clear in agricultural areas near big cities where the lure for urbanization is strongest. Seeds are becoming relatively cheaper over time, because of the provision of better seeds by the government and distributed through farmers cooperatives.

Other cost items show minor percentage changes and more careful investigations are needed to trace the exact causes.

The rice problem was finally solved in 1985 in the sense that the country did not import rice for the first time. In addition a national rice stock of over 2.5 million tons was accumulated which accounts for roughly two months of domestic consumption. Several issues arose after self-sufficiency was reached. First, heavy subsidies given to farmers in the form of investment for irrigation, production inputs such as for seeds, fertilizer, etc., have to be terminated and farmers will have to bear the full cost. Second, prices were set at levels where farmers could earn sufficient income to slowly increase their living standards and not shift to farming other

commodities that may endanger the rice self-sufficiency. Bulog (a national agency that manages the stock and price stability of major food products) buys rice during harvest time when prices tend to fall and sells from its variable stock whenever prices tend to go down. In this respect the volume of stock, both for price stability as well as for precautionary measures, becomes important, since it determines the cost of stock the country has to bear. Not only does it involve the operational aspects, but also the initial outlay for godowns, risks, wastes and deterioration of quality due to inexperience in bulk stock management. Third, once self-sufficiency is reached and a respectable stock accumulated, the logical policy would be to keep the production growth rate equivalent with the growth rate of consumption which is basically a function of population and income. Stock could be adjusted accordingly. Any production increase beyond these needs would either:

- a. Force prices down as supply will exceed demand.
- b. Require Bulog to buy the excess supply, which will increase the cost of stock if prices are to be kept constant.
- c. Force Indonesia to export rice, which is unlikely since the domestic price is already higher than world market price.

The 2.5 million tons of stock could no doubt be increased somewhat, but it should only be considered as a short term alternative measure. To leave the adjustment entirely to market forces involves the risk of unstable supply around the present level and may endanger the very idea of the self-sufficiency. For the time being at least, the government decided to increase rice stock to 3 million tons and continue giving limited subsidies to rice farmers in various forms.

Another reason for this decision is that since self-sufficiency was only reached recently; stable and regular attainment have not yet been assured. Since rice varieties need to be changed periodically due to their sensitivity to pest and insects, there is no way that the government can leave provision of seeds to farmers.

#### Other Food Crops

Production and growth rates of other food crops are shown in Tables 4 and 5. The average annual growth rates for the entire periods are as follows:

Table 10 Average Annual Growth Rates of Agricultural Food Commodities, 1969 - 1984 (%)

No. Commodity	Growth Rate			
	1969-1984		1974-1984	
	P	Y/Ha	P	Y/Ha
1. Rice	3.21	1.86	5.43	2.80
- Wet Land	3.51	1.68	5.51	2.54
- Dry Land	-0.49	0.77	4.15	1.15
2. Maize	5.82	4.31	5.94	4.59
3. Cassava	1.77	2.39	0.87	2.09
4. Sweet Potatoes	0.13	2.02	-0.69	1.00
5. Peanuts	4.57	2.21	5.45	2.92
6. Soy Beans	4.40	1.61	2.34	1.46

Source : CBS, Various Publications.

P = Production    Y/Ha = Yield per Ha

From the table we see the increase in other agricultural food crops is partly due to increase of yield per Ha and partly to expansion of hectareage. The low growth rate of yield per Ha of rice for the entire period as compared to other food crops is also due to the period taken. As has been explained earlier, serious efforts had only begun in Period II. If the growth rates are calculated from 1974, then the figures reflect the results more clearly.

It can be concluded that in the drive for food self-sufficiency, Indonesia has been successful. An equally challenging task in the future will be stabilizing production so as to meet the increasing demand, but at the same time avoiding the unnecessary costs of over-stock.

#### V. AGRICULTURE EXPORT COMMODITIES

The role of perennial crops has always been very important; especially before the oil price rises in 1973 and after 1983 when oil prices started falling. These commodities had been important foreign exchange earners, and have regained importance for obtaining much needed foreign currency.

After rice these commodities ranked second on the priority list of the agricultural development plan. In Period I existing plantations were given full attention. Funds were provided for their rehabilitation since their commodities were among the most important export items the country could rely upon. Productivities were low since plantations were from pre-war times. In spite of these drawbacks, in the early days of the First Five Year Plan these proved to yield the fastest results.

Table 11 Production of Selected Perennial Crops  
1969 - 1984 (Ton)

Commodity	1969	1974	1979	1984
1. Rubber	809	787	970	1061
- Estates	238	244	281	686
- Small Holders	571	543	689	686
2. Coffee	186	170	297	325
- Estates	16	15	21	23
- Small Holders	170	155	276	302
3. Tobacco	74	93	110	119
- Estates	6	7	9	9
- Small Holders	68	86	101	110
4. Tea	64	69	99	128
- Estates	43	55	78	100
- Small Holders	21	14	21	28
5. Cloves (S. H.)	15	27	39	56
6. Palm Oil (E)	217	411	691	1212
7. Pepper	17	23	37	46
8. Sugar Canes	1912	2411	2818	3371
- Estates	713	1030	1188	1580
- Small Holders	1199	1381	1630	1791

Source : CBS, Agriculture Statistics, Various Publications  
Dept. of Agriculture, Annual Reports.

Malaysia, which produces similar products, long before had started with its replanting and expansion scheme. Volume of production increased significantly especially in rubber and palm oil. Not until 1975 did Indonesia follow suit. By that time the position as the largest producer of rubber had been taken over by Malaysia. The delay was due not only to the food problem, which was given highest priority, but also to the fact that the necessary funds were only available after the increase of oil prices in 1973. Even then other sectors such as transportation facilities including roads, bridges, etc., which were not rehabilitated completely in Period I, received most of the remaining funds. Although falling behind Malaysia, the development of perennial commodities has always been in the country's plan.

Production of important perennial crops is in Table 11.

Several other commodities such as chinchona, cassia vera, citronella, etc. are also produced, but are neglected here due to the small volumes.

The yields per Ha could be observed from the following table.

Table 12 Yield per Ha of Major Perennial Commodities  
1970 - 1985 (Kg)

Commodity	1970	1975	1980	1985
1. Rubber	351	343	423	399
- Estates	490	569	632	761
- Small Holders	315	291	354	312
2. Coffee	477	427	422	370
- Estates	410	405	538	469
- Small Holders	484	429	415	364
3. Tobacco	569	611	774	548
- Estates	545	583	600	562
- Small Holders	571	614	795	547
4. Tea	561	726	915	1076
- Estates	693	902	1164	1449
- Small Holders	404	412	512	560
5. Cloves	183	130	100	129
6. Palm Oil	1709	2404	2731	2812
7. Pepper	378	451	544	568
8. Sugar Canes	15055	13545	9456	6623
- Estates	15844	14110	8547	4984
- Small Holders	14621	13152	10252	9328

Source : Derived from preceding Table and Planted Area.

Although domestic demand for these crops has increased, their production is still directed towards the export market. Table 13 below shows the export performances in selected years.

Table 13 Export of Important Perennial Crops 1969 - 1984

(1000 ton, US\$ Mill.)

Commodity	1969		1974		1979		1984	
	Vol	Val	Vol	Val	Vol	Val	Vol	Val
1. Rubber	757.4	225.8	740.4	479.2	861.0	936.8	1009.5	948.6
2. Pepper	16.8	10.7	15.7	24.3	25.0	46.6	33.8	64.2
3. Coffee	127.1	59.8	111.9	98.1	220.2	614.5	294.9	567.6
4. Tobacco	5.7	5.3	28.1	35.5	23.3	56.5	19.3	32.9
5. Tea	36.1	9.0	55.7	46.3	53.6	83.4	85.7	226.3
6. Palm Oil	179.1	24.0	281.2	157.3	351.3	204.4	127.9	63.3

Source : CBS, Statistical Pocketbook  
Various Editions.

### Rubber

Rubber has been one of the most important agricultural export commodities since before the war. Table 11 shows that small holders produce twice the volume of estate production. Also it is one of the most important sources of income for farmers, especially in Sumatra and Kalimantan where most rubber is produced.

As explained earlier, in Repelita I the main focus of attention was food (rice) production as far as the agriculture sector was concerned.

During the last years of Repelita I, however, attention was also directed to perennial crops because of the need for foreign currency. Existing plantations, especially small holders, were no longer very productive. Most trees were old or of low yielding varieties. In the case of estates there were fewer problems in replanting better yielding varieties, since a schedule for cutting down old trees and planting new ones could be arranged such that the remaining old trees could still bear the operating costs of the estates. In the case of small holders, however, farmers depended on whatever yield their old trees could produce. Limited land-holdings did not permit them to renew existing trees since it took at least 6 years for new plants to produce at all. Old trees supplied a meager income, at least.

Since small holders of rubber constituted around 70% of total production, it was imperative that new ways be developed to improve small-holders' rubber. Estates that were managed more efficiently were asked to give technical and managerial guidance to small-holder plantations around them. The cost of provision of high yielding seeds was borne by the government with estates as executing agencies.

Table 11 shows that significant production increases occurred between 1974 - 1979 when the average growth rate was 4.9% per annum. The leveling off after 1979 was not so much related to supply problems as to demand constraints.

It is unfortunate that while the export market was slackening due to the oil price hike, the position of largest exporter of rubber was taken over by Malaysia. Coming mostly from small holders, Indonesian rubber is of inferior quality and hence could not effectively compete with the already modernized Malaysian plantations. The disadvantage was somewhat balanced by the production of estates' rubber which is of much better quality.

The world recession that started in the early 1980's was another factor constraining production. The world market was oversupplied and prices went down, adversely affecting small holders in particular. This has discouraged the tapping of rubber trees, as is evident from the negative growth rate in production of small-holders rubber. Only the steady increase of estates' production has kept the average growth rate positive even then only at a very low percentage.

Export performance can be seen in the Table 13. Export volumes decreased by .5% in Period I,

which was consistent with production decreases for the same period. In Period II export volumes increased by 3.06% and in Period III by 3.32% per annum. Export values (stated at FOB prices) were increasing until 1979, but have shown steady downward sloping tendencies since. In 1969 the average price was US\$298.13 per ton, US\$647.22 in 1973, US\$1088.04 in 1979 and US\$939.67 in 1984.

From the production point of view, with new plantations just starting, quality improvements could be achieved more effectively. Despite the positive long-term prospects projected for the export market by various commodity experts, the near future is expected to be still more competitive considering the continuous uncertainties of the world economy.

#### Coffee

Coffee is another important export commodity. Before 1975 production was decreasing for reasons similar to those for rubber. From then until 1980 significant increases of 11.8% annually were experienced, but these dropped to 1.81% from that year on. The production of coffee serves the domestic as well as the export market. In the world market quotas and prices are very influenced by Brazil's production. The International Coffee Organization (ICO) has been discouraging producing countries from expanding coffee plantations to avoid additional oversupply that could force prices further down. This has not been successfully followed by producing countries. One strong reason is that Brazil experienced frequent crop failures, and therefore its production could not be considered a stable world supply. Another argument is that each country produces different varieties in terms of taste, aroma, etc. so that the world market could be regarded as diversified and competitive.

Indonesia has been careful in expanding its coffee plantations. In the initial stage of the coffee program priority was given to rehabilitate existing plantations. Later it switched to replanting old trees and eventually expansion. Better varieties were chosen for the second and third phase to improve quality as well as productivity. Expansion was related to existing activities both as additional or alternative side products for farmers. This will somewhat protect farmers from international price fluctuations since coffee-related income can be hedged with other products.

#### Tobacco

Tobacco is produced for domestic consumption as well as for export. The traditional auction in Holland - later moved to Bremen, West Germany is the main outlet for Indonesian tobacco. Production increased at an annual rate of 4.7% until 1980, but since then it has been more or less stable. North Sumatra, East and Central Java are the main producers. The opportunity cost of growing tobacco vis-a-vis other commodities such as sugar cane, food crops, etc. has made extensification rather difficult in Java, while in Sumatra although land is still relatively easier to obtain, technically suitable areas are almost exhausted. The Deli Tobacco requires flat land with a certain climate and elevation above sea level. Therefore, until 1980 increase in production came from productivity improvements. Utilization of second-best locations which was started after 1980 did not increase production meaningfully, but was successful in maintaining the level of total production albeit at the cost of decreased yields per Ha. It is suspected that suitable land is being used for other products in Java and that tobacco is grown in technically less suitable areas.

Export volume of tobacco was highest in 1974 when it increased to 28.1 thousand tons from 5.7 thousand tons in 1969. Although production kept increasing, export volumes decreased in the following periods. In 1984 it went down to 19.3 tons after an export level of 23.3 tons in 1978. Increasing domestic demand was apparently the main cause, since export prices showed significant increases, at least until 1979. It was US\$ 929.82 per ton in 1969 (FOB Price), US\$ 1263.35 in 1973 and US\$ 2424.89 in 1978. In 1984, however, it dropped to US\$ 1704.66 per ton.

The worldwide campaign against smoking might be another reason, though in Indonesia it is

suspected that domestic consumption has increased considerably. This is supported by the fact that both cigarette production and related taxes increased proportionally.

Future tobacco export is not expected to increase meaningfully since efforts to expanding plantations are not a priority and government's support is accordingly small.

#### Tea

Tea, cultivated on both Java and Sumatra, is also partly exported. Tea is not consumed as much as coffee domestically, except in Java where tea is consumed as ordinary drinking water. Much more specific technical prerequisites are required for tea cultivation, since the aroma which determines quality and thus price, depends mostly on climate, rainfall, etc.

As in the case of quality coffee, the main constraint for expansion is the availability of suitable land. Again opportunity costs play important roles in the utilization of the land even if other requirements are met. In the export market, Indonesia has strong competition from India, Sri Lanka and China, which are all long time exporters of tea. In early 70's several African countries managed to grow tea and succeeded in penetrating the European market previously supplied by aforementioned producers. In the future the world demand for tea will be very strongly segregated by specific characteristics and quality of the varieties produced by each country.

Production of tea increased at an average growth rate of 4.73% per annum, while exports grew at 5.93% for the same period. This implies that domestic consumption decreased. It is claimed that there has been a shift from tea to coffee, especially on Java where tea was widely consumed in the past.

Export prices also increased significantly. They increased from US\$49.30 per ton in 1969 to US\$831.24 in 1973, US\$ 1555.97 in 1978 and to US\$ 2460.61 in 1974. This is an average of 16.49% per annum for the past 15 years.

Again, expansion of plantations is limited by the availability of appropriate land. In addition, tea plantations could not be converted to other uses as fast as other crops without sacrificing most of the invested capital. Therefore, tea production is not expected to increase meaningfully since opportunity cost plays a major role in investment considerations.

#### Cloves

Indonesia used to be the largest importer of cloves which are needed to make its traditional cigarettes. Tanzania was the largest supplier before World War II. Birtg Sulawesi and Maluku were historically clove-producing regions, but a significant increase of domestic demand caused an enormous deficit. Domestic prices increased and farmers were urged to try growing cloves in non-traditional locations. Within ten years production doubled and clove imports terminated. Production prices are not as high as they were in the past, but considered still high enough to have farmers maintain their trees.

Future export is not expected since world demand does not show any signs of increasing. Therefore, production should be kept at levels to satisfy domestic uses, since additional volumes will cause downward price adjustments.

#### Palm Oil

Palm oil was mainly produced in North Sumatra in the past, but since 1975 new plantations have opened in many locations along the eastern coast of the island. Palm oil is one of the more promising perennial commodities. As with rubber, Indonesia trails Malaysia in modernizing and expanding its plantations. Even so, increase of production has been fairly high in the past 15 years. Production increased by about 12% per annum, productivity by 3.38%. That implies an increase of roughly 8.8% per annum of area planted. Domestic use of palm oil is mainly for raw material in production of cooking oil, soap, etc. In the past copra was widely used, but since

production of copra is now far below domestic demand, palm oil is used to balance the gap.

In 1969 export volume was 179.1 tons with an average FOB price of US\$ 134.00 per ton. Both volume and price increased until 1979 when volume reached 351.3 tons and at an average price of US\$ 591.84 per ton. In 1984, however, despite increasing production, export volume dropped to 127.9 tons at an average price of US\$ 494.92.

This implies slackening of world demand and increasing domestic demand. Although still at low levels, the export of finished products using palm oil as input, e.g. soap, cooking oil, etc., is encouraging.

Another problem faced by this particular commodity is processing efficiency. The average oil production obtained per 100 kg palm is presently about 17kg, while in Malaysia it is to 22 kg. This implies that aside from the agro-technical improvements, serious efforts are needed to increase the palm oil conversion ratio.

Existing world demand projections show rather good prospects for palm oil once the world economy recovers from the present recession. In Indonesia this particular product is expected to contribute to export revenues in the future. Policies related to expanding existing planting areas and improving quality are being consistently maintained.

#### Pepper

Pepper is mainly grown in South Sumatra and Lampung. Production has increased at an average rate of 6.9% per annum for the past 15 years. Domestic consumption is very low and therefore production is mostly exported. Better cultivation techniques have managed to increase yields per Ha by an average of 2.75% during the period. Area planted increased by 4%. Besides the requirements of land, expansion of pepper cultivation is also hampered by technical factors, since it is very sensitive to certain kinds of pepper diseases. Only experienced farmers are willing to grow pepper, in spite of good domestic and world prices. Most others are attracted to growing less risky crops, such as cloves, palm oil, etc.

Pepper exports have shown a steady increase of 4.77% per annum for the study period, while average prices increased by 12.68%. The encouraging prices could, unfortunately, not be followed by proportionate increases in production due to aforementioned constraints. Existing policies state that production increases will be attempted mainly in historically pepper-producing areas, both by extensification and intensification programs.

#### Sugar Canes

Sugar cane is widely grown in Central and East Java where sugar factories are located. In pre-war times Indonesia used to be a major exporter of sugar, but became a net importer after the war. Population increases and improvements in real incomes push demand significantly up. At the same time traditional growing areas have largely been converted to other uses. These two factors caused import increases which will no doubt continue if domestic production is not seriously promoted.

Presently, efforts to increase sugar production could be associated with import substitution to save foreign exchange. Therefore, since the beginning of the development plan, sugar was among items others given special attention. Programs were designed and implemented to increase production. Production rose by 3.9% per annum during the whole period, while area planted increased by 6%. This implies a negative growth rate of productivity which can again be traced to limited appropriate land. In the last few years several sugar cane plantations were opened in Sulawesi and Aceh where mini sugar factories were also constructed. Additional efforts are needed to make the chosen areas fulfill the agro-technical requirements and attain operational profitability.



## VI. FUTURE PROBLEMS AND ISSUES

Indonesia now faces two major problems, namely, balance of payment deficits and unemployment. The first problem could ultimately be solved by increasing export earnings, although for short-term remedies other devices such as foreign loans and credits are justified. No longer benefiting from high oil and gas prices of the past decade, any export increase should originate from other sectors, i.e., agriculture, manufacturing and services.

Policies have been formulated and carried out to achieve this goal. Positive results have been achieved, but not enough to compensate for the lower oil and gas prices. Manufactured exports have grown quite significantly, but since the base was relatively low, it will take time for the absolute figures to amount to a major part of export earnings. This is even more true with the service sector. Therefore, the agricultural sector will play an important role in foreign exchange earnings for some time to come.

The agricultural and the so-called informal sectors traditionally absorbed much labor, and will continue to in the foreseeable future. Therefore, the agricultural sector should be given priority to help solve both problems mentioned earlier. Several agricultural policy issues are worth considering for future plans :

### 1. Continuous Emphasis in the National Development Plan.

There are serious needs for development of agro-business to solve aforementioned problems. In addition, considering the number of people depending on agriculture for income, distributional issues require attention to be solved satisfactorily.

### 2. Recognition of Significance of an Integrated Land Use Plan.

Although land-use problems are still rare on other islands, on Java and Sumatra where the bulk of national product are produced, the question of alternative use of land is becoming more and more serious. Contradicting uses, which had previously been solved on case by case principles, need integration and tighter coordination. The need is becoming more important for environmental considerations which are increasingly pressing.

### 3. Food Production and Marketing Policy.

The success in becoming self-sufficient in rice, which has been achieved through all-out efforts on the production side, brought about several negative effects that need further adjustments and corrections. Existing programs for better planning to avoid agrotechnical mistakes, such as improper assignments of new areas, timely provision of inputs, etc., have to be evaluated and adjusted. In addition, marketing policies, such as pricing and subsidies, need periodic adjustments to address the worsening balance of trade between agricultural food and other products. On the other hand, the burden on the state budget for food subsidies should diminish gradually. This suggests the need for an overall pricing policy, more efficient marketing structure supported by reasonable transportation, information, etc.

### 4. Supporting Services.

Intensification programs to increase secondary crops have been developed throughout the country. Experiences from the rice program show that significant achievements could only be guaranteed by an efficient supporting service system including the following:

- a. Training of qualified extension service personnel for specified products,
- b. Timely provision of necessary inputs,
- c. Well-defined and efficient credit policy,
- d. Improvement of marketing by more involvement by the private sector,
- e. Encouragement of agro-industrial entrepreneurs,
- f. Encouragement of cooperative activities.

As these activities are closely interconnected, and in light of the role the agricultural sector will play, integration of development programs should be stressed more. To cope with the problems of balance of payments and employment, agriculture, industry and trade policy should be made consistent. Increases of production, especially in new production centers resulting from transmigration programs, for instance, should have provided access to wider markets including exports. Local demand is usually too small, and where locations are poorly connected with other markets, farmers are discouraged from producing beyond their own and local needs.

Since the main problems faced by the country are relatively clear, i.e. to increase exports and provide jobs, every program should be directed towards these ends. Although government efforts and intentions in the past should be acknowledged and credited, more effective, quicker programs need to be identified, formulated and implemented. This implies further policy formulation covering the agricultural, industrial and trade sectors. Supporting policies, such as closer coordination between central and local planning, must be stressed to secure orchestrated efforts. This will not only help obtain optimum results, but also speed up the process of domestic economic integration.