

GLOBAL IMPACTS OF OIL PRICE REDUCTIONS AND OFFICIAL DEVELOPMENT ASSISTANCE —Medium-Term Comparative Simulations with Alternative Global Econometric Models—

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I. INTRODUCTION

THE recent economic recovery of the world economy after almost four-years of deep recession is mostly due to positive factors such as a favorable outlook of oil prices and the lower interest rates in the United States and other industrial nations. Gloomy factors which tend to keep the world economy from accelerated, rapid recovery still prevail, however. These are (a) serious government fiscal debts in most of the industrial nations, (b) the huge accumulated external debts of major non-oil developing countries (NODCs), and (c) a fall in imports and capital outflows from OPEC to industrial and developing nations caused by reduced oil export revenues.

The purpose of the present paper is to analyze the basic mechanism and interrelations of these factors, rather than to present specific policy strategies. We focus our attention on the evaluation of medium-term impacts of oil price reductions and official development assistance (ODA), using three alternative global econometric models. Our comparative simulations were carried out by the Project LINK Model, the FUGI Global Macroeconomic Model, and the Tsukuba-FAIS World Econometric Model, on the basis of common exogenous assumptions which are specified below:

Scenario 1: Reduction of crude oil prices of U.S.\$5 per barrel in 1983 and a further reduction of U.S.\$10 per barrel starting in 1984 for the entire period, 1984–88.

The baseline scenario for this simulation assumes that the nominal benchmark prices of oil in U.S. dollars remain flat in 1983, followed by an increase of 5 per cent in 1984. In subsequent years they are assumed to be indexed to the export deflator of the OECD area.

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Scenario 2: Gradual increase in ODA for the period of 1983 to 1990, aiming at 0.7 per cent of GNP in 1990 for each developed country, only in terms of grant aid. In allocating the total ODA among NODCs, the share parameters taken from 1979–81 averages as published by OECD¹ were used for the entire period, 1983–88. The components of expenditures by NODCs from ODA are assumed to be 0.7 and 0.3 for investment and consumption, respectively.

Scenario 3: The same amount of ODA as above, but financed only in terms of loan aid.

The Project LINK Model, however, assumes a slightly different pattern of ODA in grant form. It is financed by a worldwide reduction in defense expenditures, and is allocated among NODCs according to the regional shares envisaged by the UNCTAD formula for the Complementary Compensatory Financing Facility.² The total amount of ODA is U.S.\$53 billion which is about half the value assumed in the other two models, and it follows a different time pattern with a higher weight for earlier years.³ Accordingly, the results of the Project LINK Model are not comparable to those for the other two models in Scenario 2.

Naturally, the three models are rather different in size and in type of specification, even though certain similarities such as demand-orientation for the developed country group and supply-orientation for some of the developing country groups, etc. are noticeable. In terms of number of countries or areas, the LINK model covers thirty-one, the FUGI model sixty-two, and the Tsukuba-FAIS model twenty-four. All the models deal with both real and financial aspects in each country sub-model which is linked by trade matrices.⁴

In evaluating the results of our comparative simulations, it should be noted that the results are not always comparable because of differences in the specification of behavioral equations and assumptions in policy responses which are endogenized in these models, especially with respect to fiscal and monetary policy variables, as discussed below.

Secondly, the centrally planned economies (CPEs) are covered by the LINK and FUGI models, while only their trade flows are endogenized in the Tsukuba-FAIS models.

Thirdly, exchange rates are endogenized in FUGI, but exogenized in the other two models. Accordingly, the FUGI model tends to produce somewhat restric-

¹ See OECD [4].

² See UNCTAD [14].

³ The time patterns are as below.

	(U.S.\$ billion)						
	1983	1984	1985	1986	1987	1988	1983–88
LINK	0	10.5	11.5	11.5	10.0	9.5	53.0
FUGI	5.4	9.2	13.8	19.3	25.6	33.2	106.5
Tsukuba-FAIS	3.5	7.5	12.5	18.5	25.7	34.8	102.5

⁴ A duality relationship is utilized in dealing with international trade flows and price responses in both the LINK and Tsukuba-FAIS models for different commodity groups. The FUGI model is characterized by distinguishing bilateral trade flows of order 62×62 , though not disaggregated by commodity groups.

TABLE I
OIL PRICE REDUCTION: U. S. \$ 5 AND U. S. \$ 10 PER BARREL
A. Real GNP Percent Deviation from Baseline Simulation

	1983	1984	1985	1986	1987	1988
World:*						
L	0.03	-0.07	0.28	0.31	0.64	0.57
F	0.08	0.34	0.74	0.92	1.01	1.04
T	0.19	0.20	1.06	1.32	1.24	1.14
Developed countries:						
L	0.00	-0.17	0.35	0.40	0.62	0.61
F	0.12	0.42	0.86	1.13	1.27	1.33
T	0.19	0.43	1.43	1.67	1.50	1.19
OPEC:						
L	-0.40	-0.60	-0.60	-0.60	-0.60	-0.60
F	0.00	-0.83	-1.52	-1.47	-1.47	-1.42
T	0.64	-0.28	-0.13	0.13	0.11	0.42
NODCs:						
L	0.35	0.53	0.68	0.78	0.85	0.87
F	0.01	1.09	2.75	2.68	2.60	2.48
T	0.05	-0.38	0.27	0.56	0.76	1.16
CPEs:						
L	-0.02	-0.05	-0.07	-0.10	-0.11	-0.10
F	0.00	0.01	0.02	0.03	0.05	0.07
T	—	—	—	—	—	—

B. Private Consumption Deflator† or GNP Deflator‡ Percent Deviation from Baseline Simulation

	1983	1984	1985	1986	1987	1988
Developed countries:						
L	-0.35	-0.46	-0.41	-0.12	-0.04	0.20
F	-0.40	-1.06	-1.53	-1.83	-2.00	-2.14
T	-0.62	-2.19	-3.61	-4.22	-4.27	-4.06

Note: L=LINK; F=FUGI; T=Tsukuba-FAIS.

* CPEs are not covered by the Tsukuba-FAIS model.

† LINK and FUGI models.

‡ Tsukuba-FAIS model.

tive impacts on output in the case of a currency appreciation caused by an oil price reduction.

II. THE RESULTS OF COMPARATIVE SIMULATIONS

In the case of an oil price reduction shown in Tables IA and IB, the LINK model indicates modest responses, while the other two models indicate fairly significant impacts in terms of both output and price levels. Since the results are shown in percentage deviation from a baseline (or standard) simulation,

TABLE II
INCREASE IN GRANT ODA: REAL GNP PERCENT DEVIATION FROM
BASELINE SIMULATION

	1983	1984	1985	1986	1987	1988
World:*						
L	0.34	0.39	0.41	0.46	0.50	0.54
F	0.01	0.02	0.04	0.07	0.11	0.16
T	0.05	0.09	0.11	0.08	0.06	0.04
Developed countries:						
L	0.25	0.27	0.25	0.27	0.29	0.31
F	-0.01	-0.02	-0.04	-0.05	-0.06	-0.07
T	0.03	0.04	0.02	-0.08	-0.18	-0.28
OPEC:						
L	0	0	0	0	0	0
F	0.01	0.03	0.04	0.05	0.07	0.08
T	0.02	0.05	0.08	0.11	0.14	0.17
NODCs:						
L	1.70	1.95	2.12	2.30	2.48	2.66
F	0.11	0.34	0.65	1.05	1.53	2.05
T	0.12	0.25	0.40	0.56	0.76	0.95
CPEs:						
L	0.07	0.14	0.19	0.23	0.27	0.32
F	0.00	0.00	0.00	0.00	0.00	0.01
T	—	—	—	—	—	—

* CPEs are not covered by the Tsukuba-FAIS model.

differences in rates of change can be obtained as differences between current and previous percentage deviations. In this measure, the table roughly indicates that the rate of world economic growth would accelerate by about 0.1 to 0.2 per cent and the inflation rate for the industrial world would fall by about 0-0.9 on the average annually as a result of an oil price reduction of U.S.\$5-10 per barrel. Turning to the regional breakdown, the results tend to vary somewhat according to the models. While falls in output are commonly observed for OPEC countries due to reduced export revenues, the acceleration in the growth rate in industrial countries is rather modest in the LINK model, while fairly noticeable in the other two models. For NODCs, however, the Tsukuba-FAIS model indicates the lowest responses and the other two models indicate higher increases in output. For CPEs, the LINK model shows negative impacts for the entire period, while slightly positive ones are observed in the FUGI model.

The major reasons for these differences seem to be that the LINK model results are based on higher contractionary impacts on OPEC output and import levels especially for high-absorbing nations. Elements of asymmetry and downward rigidity in response to an oil price cut appear to be more significant in LINK than in the other two models. The relatively higher responses in price and output in the Tsukuba-FAIS model are partly due to the exogeneity of exchange rate variables.

For ODA simulations, the results for the LINK model shown in Tables II

TABLE III
 INCREASE IN LOAN ODA: REAL GNP PERCENT DEVIATION FROM
 BASELINE SIMULATION

	1983	1984	1985	1986	1987	1988
	(%)					
World:*						
L	—	—	—	—	—	—
F	0.01	0.04	0.08	0.13	0.19	0.27
T	0.07	0.17	0.31	0.44	0.62	0.99
Developed countries:						
L	—	—	—	—	—	—
F	0.00	0.01	0.02	0.03	0.05	0.07
T	0.05	0.15	0.28	0.40	0.57	0.98
OPEC:						
L	—	—	—	—	—	—
F	0.01	0.03	0.05	0.07	0.11	0.14
T	0.02	0.06	0.11	0.15	0.21	0.33
NODCs:						
L	—	—	—	—	—	—
F	0.11	0.34	0.66	1.06	1.55	2.08
T	0.12	0.27	0.45	0.64	0.88	1.19
CPEs:						
L	—	—	—	—	—	—
F	0.00	0.00	0.00	0.00	0.00	0.01
T	—	—	—	—	—	—

* CPEs are not covered by the Tsukuba-FAIS model.

and III are not comparable as it assumes a much higher amount of ODA for earlier years and the amount is financed by a cut in defense expenditures, as noted earlier. For the FUGI and Tsukuba-FAIS models, their results follow similar patterns for ODA recipient countries (NODCs) and OPEC, while the impacts are smaller in the FUGI model for donor countries (DCs). The difference in DCs can probably be accounted for by the degree of monetary policy constraint for these two models and the difference in exchange rate variables. In the Tsukuba-FAIS model, money supply variables are fully endogenized. As a result there are rather flexible monetary constraints and a weaker crowding-out effect.

Generally speaking, a gradual increase in loan ODA produces stronger impacts on the world economy, especially in the Tsukuba-FAIS model where the import demand feed back from LDCs, particularly from NODCs, seems to cause expansionary effects as high as about 0.5–0.8 per cent of NODCs' output responses. Grant ODA, on the other hand, tends to produce negative effects via increased tax burdens which almost cancel positive effects from increased exports. This is confirmed by a similar pattern in both models.

The LINK model indicates the impacts of grants financed by a defense expense reduction. The feedback effects from NODCs to developed countries are also noticeable, about 0.12–0.15 per cent of NODC's output responses.

In the following sections, we discuss the properties and simulation results for each model in more detail.

III. PROJECT LINK MODEL

The purpose of Project LINK is to tie together major macroeconomic models being used in each of the main countries or regions of the world and generate a *consistent* model system for studying the world economy. The LINK approach is to accept models from each country or area as they are designed by resident model builders for their *own* use, based on the assumption that each model builder knows his own country or area best. The technical linkage, explained below, imposes only a minor degree of homogeneity across the models. The LINK system includes a broad range of different models containing from 30 to more than 1,000 equations per country. The major industrial countries account for the larger models. There are significant differences in the amount of detail implemented in these models with regard to the level of disaggregation, the representation of channels for transmitting economic policy, the simultaneous determination (endogenization) of certain variables, and many more characteristics. At present there are thirty-seven countries or areas in the LINK system. The system includes twenty-four models for OECD countries, eight models for CPEs, and four regional models for developing countries. The system is completed by a residual category for "the rest of the world."

By far the most important mechanism linking different economies is the international flow of merchandise exports and imports. The centerpiece of linkage and the technique by which consistency is maintained, is the *world-trade matrix*, an accounting design that lays out the inter-country and inter-regional trade flows on a bilateral basis. Consistency is achieved by requiring that the exports of each country or region be estimated as a weighted sum of the imports of trading partners. Essentially, what the procedure amounts to for the individual country or area model is that the model is required to generate *imports* and *export prices*, while the linkage procedure generates a consistent set of *exports* and *import prices* to be passed back into the model.

No comparable linkage mechanism is available for service flows. While individual country models generally provide a fair amount of detail for service flows vis-à-vis the rest of the world, the lack of bilateral data makes it impossible to provide a direct linkage as well as to enforce consistency; the latter problem is particularly troublesome since in the available data sets consistency is also not enforced.

Similar problems make it, for the majority of the countries, impossible to model capital flows on a bilateral basis. Again most of the models contain a certain amount of information with regard to capital flows, but this cannot be used to establish bilateral linkages. This, however, does not mean that there are no monetary linkages. Rather, they assume the form of direct linkages via interest rates and exchange rates. The exchange rate submodel is designed so as to provide a consistent set of exchange rate equations for the big ten industrial countries. In addition, countries with some sort of pegging scheme are represented in the system with that particular set of basket weight, to the extent these weights are available.

For the purpose of these simulations, we have assumed a constant marginal responding coefficient for the group of oil exporting countries on the basis of the following two considerations. First, this assumption allows a more transparent comparison with the other world econometric models. Secondly, it enables us to focus attention on the international distributional impact of alternative oil prices, without the additional effect of active countermeasures undertaken by public authorities in oil exporting countries.⁵

In addition, the LINK baseline forecast presents an unsatisfactory pattern of growth for the non-oil exporting developing countries. They appear to have continuing trade problems for their estimated f.o.b. merchandise balances are expected to deteriorate year by year. This, together with relatively slow growth well below the best growth years of the previous decades, especially for certain areas, does not present a very favorable economic prospect. It is certainly not a situation in which it will be easy to strengthen currencies, reduce inflation, or service debt.

In this respect, we think it is indeed important to analyze alternative schemes of assistance to LDCs for the rest of the decade, in the form of direct transfer of resources.

A. *Assumptions*

As far as the oil price is concerned, we assumed a common shock, which implies a reduction slightly above 17 per cent with respect to the current price, and a subsequent reduction in the order of one-third with respect to the baseline level in the following year.

As far as ODA is concerned, we have investigated the options available in the grantor countries in order to finance what amounts to an additional disbursement of resources abroad. In particular, we think that, whether the technical characteristics of the program is a pure grant or indeed a loan (which calls for additional assumptions about the initial grace period, the repayment schedule, the effective rate charged, and the modality of government guarantee), the realism of such a scenario depends crucially upon the possibility of its financing.⁶ Briefly, the public authorities could inject more liquidity into the international financial system, or raise domestic taxation, or divert resources from domestic programs to LDCs. Notice that while the first option bears apparently no cost (except for the hidden inflationary feedback), the others do, via demultiplicative effects on real activity.

On the basis of the preceding considerations and given the global international involvement in the ODA program, we have assumed that the transfer to LDCs is financed by a worldwide reduction in defense expenditures. Resources are made available to developing countries according to the regional shares envisaged by the UNCTAD formula for the Complementary Compensatory Financing

⁵ For a comprehensive discussion and analysis of endogenous responding coefficients in primary resources exporting countries, see Bollino, Pauly, and Petersen [1].

⁶ For a detailed study of these issues in the context of the UNCTAD Compensatory Financing Facility, see Klein and Bollino [3].

Facility.⁷ While these shares do not substantially differ from those computed on the basis, for instance, of the *Geographical Distribution of Financial Flows to Developing Countries* issued by OECD [4], we think that they represent a more equitable distribution. This seems to be the case, as the UNCTAD formula takes explicitly into account export earning shortfall developments and projections for the decade ahead. In this fashion, the effectiveness of the financial transfer is maximized, at least on equity grounds.

B. Empirical Results

Summary results of the scenario simulations are presented in Tables IVA and IVB. These tables present differences of four key economic variables from the baseline, for selected regional aggregates and the world.

As far as the oil price reduction is concerned, the first general consideration that emerges from both alternative oil price paths is that the effects at the world level are quite modest, albeit positive. This is perhaps not surprising given the size of the present (positive) shocks with respect to historical experiences in the recent as well as less recent past. An important reason is obviously the fact that oil importing economies tend to benefit while oil exporting countries' activity tends to be depressed. In addition, this consideration should be extended to a more detailed analysis of the net impact upon *both* oil-consuming sectors and oil producing sectors of economic activity, in developed countries such as the United States, the United Kingdom, or Norway.

The above-mentioned basic mechanism (in terms of domestic activity) induces repercussions on the international trade of non-energy commodities. Hence, domestic activity is a function of the reallocation mechanism of trading partners. Moreover, sluggish dynamic responses, as typically modelled in large-scale econometric models, contribute to generate results more complex than the standard "textbook" multiplier analysis.

On a regional basis, we notice that non-oil exporting developing countries undoubtedly benefit in terms of an increased level of economic activity. This is also the case for the European Community as a whole. In contrast, the oil exporting developing countries show a negative reaction.⁸ For the other regions the results are mixed. In the case of Japan, for instance, real exports do not show a positive contribution to GDP until 1985. The same sign reversal can be observed for the United States. In general, we observe a reduction in inflation.

In evaluating the results of these simulations, another important issue has to be mentioned. The question is whether an oil price reduction can be expected to have symmetrical effects compared with a comparable price increase. Previous experience with the LINK system shows that on an individual basis, un-linked models tend to produce almost symmetrical results, except for potential ratchet effects in the wage-price sector. In a world perspective, however, it is likely

⁷ See UNCTAD [14].

⁸ The rather modest magnitude of the decrease in this region is partly explained by the respending assumption discussed in the previous section.

TABLE IV
LINK MODEL RESULTS IN TERMS OF DEVIATION FROM BASELINE
A. Oil Price Reduction

	1983	1984	1985	1986	1987	1988
OECD:						
1	0.00	-0.17	0.35	0.40	0.62	0.61
2	-0.35	-0.46	-0.41	-0.12	-0.04	0.20
3	15.98	23.12	25.39	26.89	24.80	25.03
4	0.03	0.07	0.06	0.02	-0.01	0.01
Aus-Japan:						
1	-0.14	-0.12	0.07	0.15	0.16	0.12
2	-0.30	-0.26	-0.10	0.05	0.15	0.13
3	4.19	5.87	7.35	8.28	8.62	7.43
4	0.03	0.07	0.06	0.03	0.01	0.01
Can-U.S.A.:						
1	0.03	-0.42	0.27	0.24	0.42	0.43
2	-0.04	-0.18	-0.26	-0.04	0.14	0.29
3	5.58	7.67	7.84	8.47	7.43	9.26
4	-0.02	0.13	0.10	-0.09	-0.10	-0.18
EEC-9:						
1	-0.02	0.17	0.52	0.64	0.84	0.79
2	-0.47	-0.77	-0.58	-0.36	-0.25	-0.14
3	4.64	6.90	7.62	8.12	6.88	5.45
4	-0.00	-0.05	-0.14	-0.20	-0.24	-0.23
LDCs:						
1	0.31	0.47	0.61	0.70	0.72	0.70
3	-15.43	-22.94	-26.41	-28.73	-28.80	-30.10
OPEC:						
1	-0.40	-0.60	-0.60	-0.60	-0.60	-0.60
3	-15.74	-23.42	-26.68	-28.98	-29.07	-30.39
NODCs:						
1	0.35	0.53	0.68	0.78	0.85	0.87
3	0.31	0.47	0.27	0.25	0.27	0.29
CPEs:						
1	-0.02	-0.05	-0.07	-0.10	-0.11	-0.10
3	-0.46	0.32	1.32	1.79	2.72	2.53
World:						
1	0.03	-0.07	0.28	0.31	0.64	0.57

that high-absorbing oil producing countries would reduce their imports of manufactured goods from developed countries as a response of reduced oil revenues. In certain cases, this is coupled with an increasing burden of financing debt services. However, with respect to the debt issue, the negative effects of oil price reductions on certain debt-ridden countries (Mexico, Nigeria, and Venezuela) seems to be offset by positive effects on non-oil producing countries (Brazil, Argentina, and the Republic of Korea). Although it is difficult to identify the crucial threshold where a major default on either side could occur as a result of an extremely large variation in oil prices, some mild asymmetric effects are likely to be present.

TABLE IV (continued)
B. ODA by Defense Expenditure Reduction

	1983	1984	1985	1986	1987	1988
OECD:						
1	0.25	0.27	0.25	0.27	0.29	0.31
2	0.03	0.09	0.04	0.03	0.05	0.06
3	23.07	23.01	23.32	23.30	23.09	22.72
4	-0.06	-0.13	-0.15	-0.15	-0.14	-0.14
Aus-Japan:						
1	0.67	0.70	0.67	0.65	0.64	0.65
2	0.11	0.13	0.24	0.18	0.02	-0.07
3	6.07	6.03	5.84	5.97	6.12	6.26
4	-0.06	-0.13	-0.16	-0.15	-0.15	-0.14
Can-U.S.A.:						
1	-0.07	-0.07	0.01	0.06	0.06	0.03
2	-0.02	-0.04	-0.03	-0.01	0.03	0.04
3	7.96	8.46	8.32	8.39	8.76	9.24
4	0.01	0.01	-0.02	-0.05	-0.07	-0.06
EEC-9:						
1	0.65	0.64	0.43	0.44	0.53	0.69
2	0.03	0.09	0.07	-0.02	-0.07	-0.10
3	7.34	6.92	7.67	7.13	6.01	4.65
4	-0.04	-0.13	-0.11	-0.10	-0.11	-0.13
LDCs:						
1	1.52	1.74	1.90	2.05	2.22	2.37
3	-25.96	-25.57	-25.17	-24.76	-24.39	-24.02
OPEC:						
1	0	0	0	0	0	0
3	0.40	0.98	1.49	2.01	2.49	2.96
NODCs:						
1	1.70	1.95	2.12	2.30	2.48	2.66
3	-26.36	-26.55	-26.67	-26.77	-26.87	-26.98
CPEs:						
1	0.07	0.14	0.19	0.23	0.27	0.32
3	2.50	2.15	1.70	1.40	1.21	1.09
World:						
1	0.34	0.39	0.41	0.46	0.50	0.54

Note: 1=real GNP (%); 2=private consumption deflator (%); 3=f.o.b. trade balance; 4=unemployment rate (%).

Let us now turn our attention to the transfer scenario. We observe that this scenario results in a monotonic improvement of the world level of economic activity. This holds true also at the regional level, with the exception of the United States in the first two years of the simulation period. On a world scale, therefore, the improvement can be expected to be on the order of three-tenths to half a percentage point at the end of the simulation period.

Notice that a cut in defense expenditures tends to reduce GDP, similarly to any restrictive fiscal policy. On the other hand, the expansionary effect induced

by increased demand for imports from the LDCs tends to offset, and indeed over-compensate for, the initial negative impact of reduced government expenditure.

The above-mentioned phenomenon seems to be a fairly standard result for scenarios involving transfer to areas with high marginal propensities to import. In fact, the OECD trade balance is shown to improve at the expense of the LDCs. Moreover, the policy is seen to be essentially non-inflationary.

A final point deserves attention. The reduction in defense expenditure frees resources for civilian activity in the medium term. As the expected stream of return from an amount of resources invested in goods is lower than a comparable investment in civilian productive capital, a secondary beneficial effect could be expected from the policy strategy envisaged in this scenario.

C. Summary

The major purpose of these scenarios was to examine and analyze the effects of two alternative oil price paths and an increase in official development aid on the world level of economic activity.

The results seem to indicate that a lowering of oil prices can be expected to have a modest beneficial impact on the world. It is suggested that the asymmetries with respect to oil price variations could partially explain the non-spectacular outcome of the simulations. In addition, trade reallocation induced by shifts in import demand patterns appears to make the world responses less clear-cut than otherwise expected on the basis of "textbook" multiplier analysis.

As far as the transfer to LDCs is concerned, the results point in the direction of a beneficial effect for the world as a whole. In particular, as a result of what is essentially a transfer of resources from lower to higher absorption regions, the LDCs are expected to gain in terms of GDP, at the expense of a deterioration in the trade balance. Partially as a result of defense expenditure reductions necessary to finance the transfer, the activity increase in DCs is more modest.

IV. FUGI MODEL

In the FUGI Global Macroeconomic Model,⁹ the world divided into sixty-two countries and the country groupings, with each of these blocks having eleven "sub-blocks" incorporated as follows: (i) production with energy constraints; (ii) expenditures on real GDP; (iii) distributions of income, profits, and wages; (iv) prices; (v) expenditures on nominal GDP; (vi) money supply; (vii) interest rates; (viii) government finance; (ix) international balance of payments; (x) ODA and private direct foreign investment to developing countries; and (xi) foreign exchange rates.

A. Assumptions

Regarding the oil price simulation, the oil price (*PEO*) is treated as an endogenous variable in this model, although it can be manipulated as a policy-oriented variable through constant term adjustment.

⁹ See Onishi [2] [5] [6] [7] [8] [9].

It is assumed that the oil price will be to a large extent indexed to inflation rates, economic growth rates, and exchange rates of the selected ten industrial countries as adopted in the OPEC long-term strategy for oil pricing. It is worth noting that the oil price during the successive oil crisis periods 1972-81 can be adequately explained by the following formula:

$$\begin{aligned} DOT(PEO) = & -0.0884 + 0.8803DOT(GIFI10_{-1}) + 4.106DOT(GDP\#110_{-1}) \\ & (-0.5146) (0.7923) \quad (1.5748) \\ & + 2.5543DOT(FERSI10_{-1}) + 1.9239FSO1 + 0.4551FSO2, \\ & (2.7426) \quad (11.7263) \quad (3.8663) \\ \bar{R}^2 = & 0.9897, \quad S.E. = 0.1031, \quad DW = 2.4074, \end{aligned}$$

where $DOT(PEO)$ denotes a percentage change in the oil price index (1975 = 1); $GIFI10$ is a weighted average inflation rate index (1975 = 1) of the group of ten industrial countries, and it is a composite inflation rate index derived from a weighted average export price index, $PE10$, and consumer price index, $CPI10$ ($GIFI10 = 2/3 PE10 + 1/3 CPI10$); $GDP\#110$ denotes real GDP index (1975 = 1) of the group 10; $FERSI10$ denotes a weighted average exchange rate index of the group 10 (inverse index, $1/FERSI10$, 1975 = 1); $FSO1$ and $FSO2$ are dummy variables of the first (1973/74) and the second (1979/80) oil shock respectively.

It is expected that the oil price reduction will give positive impacts on the oil importing developing countries through an improved capacity to import, although the OPEC countries seem likely to be affected by their deteriorated terms of trade.

On the other side, it is expected that the oil price reduction would contribute to stabilize domestic prices in most countries through increased labor productivity and restricted import price increases, unless these positive impacts are offset by other negative impacts stemming from weakened currency exchange rates, wage increases, monetary expansion and other commodities price rises, etc.

In this global model, ODA is treated as a policy variable where its target is set at a certain percentage of GDP at current prices (in terms of current U.S. dollar) of OECD/DAC member countries. ODA is subdivided into two categories, namely, bilateral ODA ($ODAB$) and multilateral ODA ($ODAM$). $ODAB$ is first determined as a function of ODA, and $ODAM$ is obtained as residual. Then $ODAB$ is directly distributed to the developing countries as recipients through a distribution coefficients matrix, $OMEGAMAT$, which is estimated from the average distribution patterns of 1979, 1980, and 1981. On the other side, $ODAM$ is allocated indirectly to the developing countries through multilateral agencies from the world pool of $SUM(ODAM)$, and will turn to be AM which denotes aid received from multilateral agencies in the recipient countries.

Bilateral aid, $ODAMAT<SUMI>$ and multilateral aid, AM , together with the inflow of private direct foreign investment, $PEDIMAT<SUMI>$ from developed countries and, in some cases, aid received from socialist countries, AC , contributes to an increase in foreign capital inflow (FCI) in the developing countries. FCI plays a significant role to increase the capacity to import ($CAPM$)

of the developing countries. *CAPM* is also affected by real exports in the previous year adjusted by terms of trade, deducting oil imports in the case of oil importing countries. In this model, *CAPM* has the two major functions of determining bilateral trade flows, *E#MAT*, related to the developing countries and nonhousing investment (*NHI#*) in the developing countries.

As a result, ODA seems likely to play an important role to increase the capacity to import of developing countries and to accelerate economic development of developing countries through increased investment and labor productivity. On the other side, the developed countries also can reasonably expect positive impacts through trade expansion toward developing countries, unless negative impacts through increased burden of aid add up to offset these positive trade expansion effects.

B. *Empirical Results*

Based on the alternative scenarios mentioned above, we have made projections for the world economy, with special reference to North-South interdependence during the period 1983-88. The main results can be summarized as follows.

The baseline projection indicates that the real economic growth rate of the world economy as a whole remained only 0.7 per cent in 1982 and will recover to the level of 2.2 per cent in 1983. The world economic growth performance in 1983-88 seems likely to register at 3.3 per cent of the annual average rate, which is lower than the 3.9 per cent of the past performance in the 1970s. It is expected that the annual average growth rate of real GDP of the developed countries will be 2.9 per cent during the period 1983-88. On the other hand, the developing countries will expect a real GDP growth with an annual average rate of 4.2 per cent during the same period.

The North-South per capita income gap seems likely to remain unchanged in the 1980s, since the gap will move from 11.0:1 in 1980 to 11.6:1 in 1985 and back to 11.5:1 in 1988, if it is measured in 1975 prices with 1975 dollar exchange rates. Therefore, the North-South income differential will be unlikely to improve under the current international environment, without any drastic changes in domestic and global development policies.

As Table VA indicates, the lower oil price will most likely increase the real economic growth of oil importing developing countries and tend to restrain the economic growth rate of oil exporting developing countries. According to this scenario, it is expected that the real GDP of the non-oil developing countries as a group will be increased by 2.48 per cent in 1988 and its annual average growth rate over 1983-88 will be increased by 0.43 percentage points compared with the baseline projection. In contrast, the real GDP of the oil exporting countries will be decreased by 1.42 per cent in 1988 and its annual average growth rate for the same period will be decreased by 0.25 percentage points. On the other hand, the real GDP of the developed countries will be enlarged by 1.33 per cent in 1988 and their annual average growth rate of real GDP will be increased by 0.23 percentage points in 1983-88 compared with the baseline projection.

TABLE V
FUGI MODEL RESULTS
A. Oil Price Reduction

1. Real GNP Percent Deviation

	1983	1984	1985	1986	1987	1988
						(%)
World	0.08	0.34	0.74	0.92	1.01	1.04
World (excl. CPEs)	0.10	0.41	0.91	1.12	1.23	1.26
Developed countries:	0.12	0.42	0.86	1.13	1.27	1.33
Japan	0.48	1.16	1.88	2.13	1.93	1.75
U.S.A.	0.16	0.56	0.89	1.10	1.24	1.29
France	0.02	0.23	0.33	0.46	1.17	1.61
F.R.G.	-0.03	0.04	0.73	1.36	1.22	1.01
Italy	-0.07	0.24	0.13	0.16	0.34	0.38
U.K.	0.01	-0.11	0.50	0.48	0.64	0.58
Developing countries:	0.01	0.37	1.12	1.09	1.04	0.98
Asia	0.02	0.10	0.18	0.31	0.49	0.57
East Asia	0.07	0.51	0.77	1.04	1.45	1.47
ASEAN	0.00	0.06	0.18	0.33	0.48	0.60
Other Asia	0.00	-0.08	-0.15	-0.11	-0.07	-0.02
Middle East	0.00	-0.30	-0.59	-1.08	-1.52	-1.88
Africa	0.00	0.04	0.10	0.13	0.16	0.17
Latin America	0.00	1.04	3.14	3.16	3.06	2.98
CPEs	0.00	0.01	0.02	0.03	0.05	0.07

2. Consumer Price Percent Deviation

	1983	1984	1985	1986	1987	1988
						(%)
World	-1.10	-1.77	-2.08	-2.59	-2.57	-2.35
World (excl. CPEs)	-1.13	-1.83	-2.21	-2.77	-2.77	-2.56
Developed countries:	-0.40	-1.06	-1.53	-1.83	-2.00	-2.14
Japan	-0.53	-1.23	-1.47	-1.58	-1.60	-1.57
U.S.A.	-0.19	-0.61	-0.94	-1.09	-1.18	-1.24
France	-0.27	-1.03	-2.05	-2.75	-2.84	-2.87
F.R.G.	-0.05	-0.09	-0.06	-0.06	-0.20	-0.40
Italy	-0.26	-0.90	-1.60	-2.14	-2.52	-2.69
U.K.	-0.07	-0.05	0.13	0.27	0.38	0.43
Developing countries:	-1.05	-1.51	-2.35	-2.70	-2.52	-2.19
Asia	-0.69	-1.63	-2.14	-2.36	-2.51	-2.59
East Asia	-1.25	-2.86	-3.59	-3.85	-4.03	-4.12
ASEAN	-0.63	-1.44	-1.88	-2.07	-2.24	-2.36
Other Asia	-0.47	-1.18	-1.66	-1.91	-2.06	-2.13
Middle East	-0.10	-0.23	-0.94	-1.17	-1.29	-1.61
Africa	-0.07	-0.08	-0.31	-0.68	-0.93	-1.14
Latin America	-1.04	-2.73	-4.75	-4.88	-4.60	-4.27
CPEs	-0.02	-0.05	-0.09	-0.13	-0.15	-0.17

The current balance of payments position in 1988 will improve by U.S.\$26.3 billion in the developed countries and by U.S.\$2.5 billion in the non-oil developing countries, while it will deteriorate by U.S.\$34.8 billion in the oil exporting countries compared with the baseline projection.

If the OECD/DAC member countries increase ODA to achieve the 0.7 per cent ODA/GDP target by 1990 only in terms of grant aid to developing countries, as shown in Table VB, the impacts of ODA on both trade and GDP expansion in the developing countries as a group will be smaller than in the case of loan aid. It is expected that the annual average growth rate of real GDP for 1983-88 will be increased by 0.22 percentage points in developing countries as a whole and by 0.35 percentage points in non-oil developing countries. The improvement of real GDP of the developing countries (non-oil) as a whole will be 1.29 (2.05) per cent in 1988 in terms of percent deviation, although the OECD countries, for instance, will decrease their real GDP by 0.07 in 1988 and decelerate its annual average growth rate by 0.01 percentage points for the period 1983-88 compared with those of the baseline projection. Therefore, an increased ODA through strengthening the tax burden in the developed countries seems likely to lower their real economic growth rates to some extent, although it may help reduce an otherwise widening North-South income gap. It is likely that the lowered economic growth rates of the developed countries could be compensated, if other coordinated policy measures among OECD countries would be introduced simultaneously introduced in order to offset the initial negative impacts.

According to this scenario, world trade will be increased by U.S.\$7.9 billion at current prices and by U.S.\$4.6 billion at 1975 prices in 1988 compared with the baseline projection.

If the OECD/DAC member countries change their aid conditionality to increase their ODA only in terms of loans, it is expected that the real GDP of the developing countries (non-oil) as a group will be increased by 1.33(2.08) per cent in 1988 and its annual average growth rate over 1983-88 will be increased by 0.23(0.36) percentage points compared with the baseline projection, as shown in Table VC. It is worth noting that real GDP of the developed countries will be increased by 0.07 per cent in 1988 and the increase in the real economic growth rate of the developed countries will be 0.01 percentage point per year for the period 1983-88, compared with the baseline projection, while their current balance of payments position will be improved by about U.S.\$7.4 billion as a whole in 1988.

According to this scenario, it is expected that world trade in 1988 will increase by U.S.\$11.9 billion in current prices and U.S.\$6.3 billion in 1975 prices. This scenario, therefore, seems likely to be more beneficial to both the North and the South than in the case of grant aid.

C. Conclusion

The prospects of world economic development depend heavily on the future of North-South relations. As was stated previously, the economic growth perspective of the developing countries in 1983-88 will depend on alternative policy

scenarios. According to the baseline scenario, the economy of developing countries as a whole may grow at a 4.2 per cent average annual rate for the period 1983–88. However, its yearly growth perspective will most likely range from around 4.1 per cent to around 4.4 per cent according to the policy alternatives with regard to aid and oil prices. In the ODA simulation with a grant, we did not introduce the assumption that a certain percentage of grants should be used to raise labor productivity in the developing countries through technical cooperation. If such technical cooperation would be intensified, it is expected that potential impacts of grants on the economic development of the developing countries should be much larger. If the developed and the developing countries coordinate their actions in science and technology, monetary and public finance, exchange rates, trade and investment in addition to the oil price and aid policies which we have discussed here, a brighter future could be expected.

V. TSUKUBA-FAIS MODEL

The present model, Tsukuba-FAIS World Econometric Model VI,¹⁰ is an annual world econometric model covering twenty-four regions and two trade matrices: primary and industrial products. Since the export and import functions for the primary products are linked to the world commodity market for six commodity groups through a product-mix converter matrix (24×6), any changes in the world oil prices give rise to changes in export prices and volumes which in turn affect domestic demand, output, import, employment, and prices. Another causal channel in the model is related to the supply side in which import prices affect various domestic price levels as well as terms of trade accompanied by international transfers of real income between oil producing and consuming countries.

A. Assumptions

In order that the results be more realistic, we assumed in the present simulation for the oil price reduction that the real government expenditures by OPEC countries are cut by 50 per cent of reduced export earnings for the entire period. Accordingly, an expansionary effect of the oil price cut on the world economy is somewhat offset because of this treatment for OPEC.

The second aspect of the oil price changes concerns with monetary variables such as balance of payments, capital flows, exchange rate and interest rate adjustments, etc. In view of the convenience for long-term simulation, the exchange rate is tentatively assumed to be exogenous, although all of the other variables are treated as endogenous in the developed country submodels. As easily noted, a lower oil price tends to cause a surplus in the balance of payments, a relatively higher amount of money supply and a lower rate of interest, resulting in an increase in capital outflows.

¹⁰ In the present version, government consumption and investment variable are treated as exogenous in real terms instead of money terms. These exogenous variables are in money terms in the previous versions. For details on previous models, see Shishido [10] [12] [13].

TABLE VI
TSUKUBA-FAIS MODEL
A. Oil Price Reduction

1. Real GNP Percent Deviation

	(%)					
	1983	1984	1985	1986	1987	1988
Developed countries:	0.19	0.43	1.43	1.67	1.50	1.19
Japan	1.12	2.97	5.26	5.05	3.85	3.32
U.S.A.	0.47	1.70	2.63	2.26	1.26	0.36
Canada	-1.36	-2.62	-1.67	0.69	2.69	3.24
U.K.	-0.68	-2.02	-0.32	-0.60	1.04	-0.13
France	-0.74	-3.12	-3.79	-3.70	-3.10	-2.05
F.R.G.	-0.46	-1.36	-0.22	1.43	2.03	2.20
Italy	0.26	0.05	2.38	4.21	5.01	5.62
Australia	-1.65	-3.77	-2.28	-0.84	0.06	-0.19
Other DCs	0.14	-0.52	-0.56	0.00	0.52	0.71
OPEC	0.64	-0.28	-0.13	0.13	0.11	0.42
NODCs	0.05	-0.38	0.27	0.56	0.76	1.16
World (excl. CPEs)	0.19	0.20	1.06	1.32	1.24	1.14

2. GNP Deflators Percent Deviation

	(%)					
	1983	1984	1985	1986	1987	1988
Developed countries	-0.62	-2.19	-3.61	-4.22	-4.27	-4.06
Japan	-0.76	-2.48	-3.31	-3.00	-2.73	-2.71
U.S.A.	-0.70	-2.06	-3.16	-3.74	-3.92	-3.82
Canada	-0.90	-3.45	-6.05	-7.12	-6.63	-4.96
U.K.	-0.09	-3.24	-7.11	-8.59	-7.92	-6.74
France	-0.46	-1.36	-2.24	-3.11	-3.95	-4.69
F.R.G.	-0.38	-1.56	-3.01	-3.30	-2.31	-0.72
Italy	-1.30	-3.79	-5.69	-6.85	-7.53	-7.72
Australia	-1.16	-3.86	-5.77	-6.45	-6.26	-5.85
Other DCs	-0.37	-1.46	-2.93	-4.04	-4.68	-5.02

In the following we shall discuss these aspects on the basis of the results of our simulations.

B. Empirical Results

Table VIA-1 indicates the impacts of a crude oil price cut on real GNP for 1983-90. Generally speaking, a remarkable acceleration in the growth rate is observed for the first half of the period and a gradual leveling off for the rest of the period for developed countries. Japan and Italy are countries showing noticeable growth rates, while the United Kingdom, France, and Australia indicate lower responses, especially for the first half of the period. These differences in response patterns are attributable to (a) the import dependency of crude oil consumption, (b) import price sensitivities of export functions and of domestic

TABLE VI (continued)
 B. ODA Increase in Grant Aid: Real GNP Percent Deviation

	(%)					
	1983	1984	1985	1986	1987	1988
Developed countries:	0.03	0.04	0.02	-0.08	-0.18	-0.28
Japan	0.11	0.25	0.33	0.33	0.35	0.40
U.S.A.	-0.01	-0.07	-0.18	-0.33	-0.48	-0.63
Canada	-0.01	-0.04	-0.14	-0.37	-0.70	-1.08
U.K.	0.02	-0.02	-0.05	-0.13	-0.14	-0.20
France	0.07	0.18	0.28	0.25	0.27	0.21
F.R.G.	0.03	0.08	0.11	0.08	-0.01	-0.11
Italy	0.04	0.03	0.00	-0.09	-0.24	-0.44
Australia	0.07	0.12	0.15	0.10	0.05	0.03
Other DCs	0.02	0.04	0.04	-0.06	-0.18	-0.29
OPEC	0.02	0.05	0.08	0.11	0.14	0.17
NODCs:	0.12	0.25	0.40	0.56	0.76	0.95
Korea	0.02	0.07	0.10	0.12	0.13	0.14
Philippines	0.13	0.27	0.42	0.56	0.74	0.94
Thailand	0.16	0.32	0.51	0.74	1.02	1.37
India	0.10	0.20	0.34	0.50	0.73	0.96
Egypt	0.19	0.39	0.64	0.92	1.26	1.66
Mexico	0.02	0.04	0.08	0.11	0.16	0.19
Brazil	0.04	0.10	0.20	0.35	0.53	0.65
Argentina	0.05	0.12	0.22	0.33	0.50	0.71
Other NODCs	0.25	0.51	0.77	1.01	1.26	1.55
World (excl. CPEs)	0.05	0.09	0.11	0.08	0.06	0.04

price functions, and (c) export dependency on OPEC countries. Japan is mostly affected by the first factor, while Italy seems to be affected by the second factor. The negative response by France for the earlier period is probably caused by the third factor.

As for the effects on inflation in Table VIA-2, an oil price cut of about 30 per cent gives rise to a remarkable deceleration in inflation especially for the first half of the period through the general fall in import prices. The falling tendencies are particularly noted for Canada, the United Kingdom, and Italy. For the rest of the period, however, the price levels of most industrial countries tend to rise, reflecting a growing world demand for exports especially in Canada, the United Kingdom, Federal Republic of Germany, and Australia. The United States tends to show a moderate fall in prices for the earlier period with a gradual rebound for the rest of the period.

As a result of a serious fall in export earnings, the OPEC countries show negative responses in real GNP for the earlier period, but tend to gradually recover later on.

The NODCs group as a whole shows positive, but relatively smaller, responses in real GNP.

TABLE VI (continued)
C. ODA Increase in Loan Aid: Real GNP Percent Deviation

	(%)					
	1983	1984	1985	1986	1987	1988
Developed countries:	0.05	0.15	0.28	0.40	0.57	0.98
Japan	0.15	0.41	0.72	1.01	1.44	2.32
U.S.A.	0.02	0.05	0.07	0.08	0.09	0.15
Canada	0.02	0.12	0.28	0.49	0.80	1.29
U.K.	0.06	0.13	0.21	0.23	0.31	0.53
France	0.08	0.27	0.54	0.84	1.31	2.22
F.R.G.	0.04	0.15	0.32	0.51	0.71	1.20
Italy	0.05	0.13	0.27	0.43	0.66	1.08
Australia	0.09	0.23	0.39	0.49	0.60	0.94
Other DCs	0.02	0.10	0.22	0.31	0.45	0.98
OPEC	0.02	0.06	0.11	0.15	0.21	0.33
NODCs:	0.12	0.27	0.45	0.64	0.88	1.19
Korea	0.04	0.13	0.24	0.36	0.51	0.77
Philippines	0.13	0.30	0.48	0.64	0.84	1.07
Thailand	0.16	0.34	0.54	0.75	0.98	1.23
India	0.10	0.21	0.36	0.53	0.79	1.09
Egypt	0.19	0.40	0.66	0.96	1.33	1.81
Mexico	0.02	0.06	0.12	0.18	0.26	0.37
Brazil	0.05	0.12	0.25	0.45	0.69	0.96
Argentina	0.05	0.14	0.25	0.38	0.57	0.85
Other NODCs	0.26	0.54	0.84	1.11	1.41	1.84
World (excl. CPEs)	0.07	0.17	0.31	0.44	0.62	0.99

As for the balance of payments, most of the developed countries indicate large amounts of surplus in current account, which roughly correspond to the great deficits in OPEC, as given below.

CURRENT BALANCES

	(U.S.\$ billion)					
	1983	1984	1985	1986	1987	1988
DCs	31.3	46.3	46.9	56.3	57.7	67.3
OPEC	-33.8	-60.3	-56.6	-58.5	-54.0	-53.4
NODCs	6.3	22.5	17.4	8.9	3.4	-6.4
CPEs	-3.9	-8.4	-7.6	-6.7	-7.2	-7.5

NODCs are notable for a certain amount of improvement in current balances, especially for the earlier period.

Regarding the changes in exchange rates, submodels are used to provide approximations for major industrial countries.¹¹ Rising tendencies are observed for

¹¹ See S. Shishido and H. Satō [11].

Japan and the United States, while falling tendencies are noted for France, Germany, and Australia, mostly reflecting the changes in current balances.

As for ODA, simulations were made separately for grant and loan aid with the same target of 0.7 per cent of GNP of all the developed countries in 1990. Japan and the United States, for instance, indicate greater amounts of ODA because of their lower contributions in recent years. The French contribution remains relatively low because its recent contribution is as high as 0.66 per cent according to OECD statistics. In allocating the total ODA among NODCs, the share parameters taken from 1979–81 averages were used for the period 1983–90.

1. *Simulation of grant aid*

Unlike in the case of loan aid, it is assumed for the industrial countries that the amount needed for grant aid is financed by the tax revenues which tend to reduce their domestic consumption and investment. Domestic output and imports are similarly affected, though depending on the parameters of the related macroeconomic equations. If the increased imports by NODCs stimulate the exports of the industrial countries, contractionary impacts of grant aid on the developed countries are likely to be canceled.

Table VIB indicates some negative responses of real GNP for the United States, Canada, Italy, and other developed countries, while positive responses are observed for Japan and France. The average response for the developed countries as a whole turns out to be slightly negative, but remains rather insignificant.

The NODCs' real GNP, on the other hand, is significantly affected, amounting to about 0.2 per cent of acceleration in growth rate. Egypt, Thailand, and other NODCs are nations which most substantially benefit as far as the present shares of ODA are assumed to continue.

As for the current balances which are indicators of net resource transfers, about 50 to 40 per cent of ODA turns out to be held by the recipient countries, while the rest of ODA returns to the donor countries as net export earnings, as shown below.

ODA AND CURRENT BALANCES

	(U.S.\$-billion)						
	1983	1984	1985	1986	1987	1988	1983–88
ODA	3.5	7.5	12.5	18.5	25.7	34.8	102.5
DCs	-1.7	-3.3	-5.9	-9.2	-12.6	-16.0	-48.7
OPEC	0.4	0.8	1.2	1.6	2.4	3.6	10.0
NODCs	1.2	2.3	4.5	7.5	10.1	12.3	37.9

Among developed countries, the United States is one whose current balances are most adversely affected. A submodel check using exchange rate equations also indicates a slight falling tendency of the dollar throughout the period, while there are some rising tendencies for most of the other industrial nations, except Italy.

2. *Simulation of loan aid*

In simulating loan ODA with the model, three points need to be clarified. First, there are no impacts on domestic demand through increased tax burdens, especially for the developed countries with higher ODA targets such as the United States and Japan. Secondly, however, financial outflows by the government tend to tighten domestic capital markets, leading to higher interest rates and lowering investment, unless the money supply is flexibly adjusted. Private capital flows are likely to be held down by the increased interest rates. The extent of tightness depends on the nature of capital markets and policy on responses by monetary authorities which are endogenized in the present model. Thirdly, there are increased interest payments by NODCs and a corresponding amounts of interest revenues for the developed countries in the case of loan ODA. Regarding the recent issues of bad debts and worsening debt-service ratios, the model does not explicitly take into account an automatic policy adjustment mechanism in lending behaviors.

The results in Table VIC indicate fairly expansionary effects of a loan on real GNP for most NODCs as compared with the case of a grant in Table VIB. The expansionary impacts are more noticeable for the developed countries, especially for Japan and France, while the negative responses in the previous case in the United States, Canada, and other developed countries now turn out to be significantly positive. This probably implies that crowding-out effects on investment by loan ODA are rather insignificant because of a flexible money supply of the monetary authorities in most of the countries.

Significant changes are also noted for the balance of payments, i.e., for both current and overall balances. The current balances show significant improvements for the developed countries and OPEC, and significant deteriorations for NODCs, quite in contrast to the case of grant ODA. Overall balances, on the other hand, deteriorate in the developed countries, especially in the United States, while those in OPEC and NODCs significantly improve as shown below.

OVERALL BALANCES							
	(U.S.\$ billion)						
	1983	1984	1985	1986	1987	1988	1983-88
DCs	-2.3	-5.1	-8.7	-13.4	-17.9	-19.4	-66.8
OPEC	0.4	0.9	1.6	2.3	3.3	5.6	14.1
NODCs	1.2	2.0	3.4	5.2	5.9	4.8	22.5
CPEs	0.1	0.3	0.4	0.4	0.5	1.3	3.0

The figures seem to imply that about 70 per cent of ODA is transferred abroad as net financial resources from the developed countries, while about 30 per cent of ODA is held as net foreign assets by NODCs.

As for the exchange rates, the submodels indicate declining tendencies for most of the developed countries, including the United States, again in contrast to the case of a grant. Japan and Germany are exceptions indicating a gradually rising trend.

C. Some Concluding Remarks

The above comparative study on means for ODA can be summarized as follows:

First, the global expansionary effects on output are greater in the case of loan aid than in the case of grant aid. This is especially the case for developed countries. NODCs' responses in output growth are slightly greater in the case of loan, though debt-service ratios tend to deteriorate.

Secondly, for NODCs, the case of loan aid shows an improvement in overall balances at the cost of a deterioration in current balances, while the case of grant aid indicates an improvement in current balances.

Thirdly, because of the relatively larger amounts of ODA, the value of the U.S. dollar tends to become weaker against other currencies, especially in the case of grant aid.

Fourthly, countries benefiting most from the 0.7 per cent target are Japan, France, and Egypt and other NODCs (mostly the least developed nations).

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