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Working Paper

Comparing the effects of the second OPEC oil price shock on income and resource allocation in four oil-poor developing economies: Ivory Coast, Kenya, South Korea, Turkey

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1. Introduction

The large OPEC-engineered real world oil price increases of the early and late 1970's have set in train, via a highly integrated international trade and finance system, significant resource transfers from energy-poor to energy-rich countries. In accommodating these resource transfers both energy exporting and importing economies have been confronted with adjustment pressures. In the case of the former group, these adjustment pressures have arisen from the need for these economies to accommodate a favourable shift in their foreign terms of trade, ostensibly by way of a redirection of resources from the international to the domestic account, thus permitting higher real national income. For energy-poor countries however the required adjustment process has much less palatable consequences for economic growth and the real income aspirations of the populations.

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Our concern in this paper is with a subset of the latter group - the socalled oil-poor developing countries. We focus in considerable detail on four such economies; Kenya, South Korea, Ivory Coast and Turkey. As well as representing various levels of oil 'poorness' these countries exhibit interesting differences in resource endowments, the industrial composition of their gross domestic products, the oil intensity of their industrial production technologies, the skill composition of their labour forces, their openness to world trade and their commodity composition of exports and imports. By means of multisectoral economy-wide models for each of these countries, we quantify the nature and extent of the adjustment pressures imposed on them by what has now become known as the second OPEC oil shock of 1978-80.[1] Many of the pressures arising from this shock are of course still working their way through the world economic system. A feature of the country models is their design flexibility and simple solution algorithm.

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[1] A number of previous studies have looked at the balance of payments implications for developing countries from external shocks in the world economy of the 1970's. Perhaps the best known of these is the study by Balassa (1981). This study of 12 developing economies used a time-series approach to determine the deviation of selected variables from their trend and base values that could be attributed to the shocks. The study focused on four main types of policy response to the external shocks, namely external financing, export promotion, import substitution and the lowering of economic growth. A similar approach was also used by Nunnenkamp (1979) (for South Korea and Brazil) and World Bank (1981). It should be noted however that the methodology used in these studies is not able to isolate the effects of the oil shock from the effects of other shocks which occurred over the period studied.

We exploit this by generating results under a variety of assumptions which incorporate both short and medium run macroeconomic and factor market characteristics. The modelling procedure followed allows us to study the effects of the oil shock independently of other influences.

We specify a common exogenous shock and a common set of assumptions about the macroeconomic environment and labour market for our four country models. We then generate and compare projections for key economic variables across countries. The emphasis of our analysis is more towards making cross-country comparisons than to providing a detailed interpretation of the projections for any particular country. Differences in the relative response of variables across countries to the common exogenous shock are rationalised in terms of the cross-country differences in key economic characteristics.

The paper is structured as follows; Section 2 provides a short comparative description of the structural characteristics of the four economies under study. A number of these characteristics prove to be important later in explaining the pattern of results across countries. Section 3 discusses the structural equation system of the country models. Section

4 specifies three simulations which incorporate different assumptions about the macroeconomic and labour market environments in which the oil shock is imposed. A cross-country comparison of key results is presented in Section 5. Section 6 contains concluding remarks.

2. Key Structural Features of the Four Economies

Table 1 focuses on some key characteristics of the four economies which could be expected a priori, to be important in an explanation of the different adjustment pressures imposed on these countries by an oil shock. In terms of gross domestic product (GDP) per capita, Korea, Ivory Coast and Turkey are roughly comparable. Kenya however has a GDP per capita of only one third of that of the other countries. Kenya, Korea and Ivory Coast are extremely open economies with trade constituting from 25 to 37 per cent of their GDP's. Turkey, on the other hand, is a relatively closed economy with trade constituting only 8 per cent of GDP in the base period. There are substantial differences in the role played by crude oil and oil products across the four countries. Only Turkey had a domestic crude oil extraction industry in the period under study.[1] Domestic oil production accounted for about 28 per cent of Turkey's crude oil requirements in the base period. In the other three countries crude oil is a non-competing import. Imports of crude oil and oil

[1] Although the Ivory Coast has recently struck oil, it was completely dependent, during the 1970's, on imports for its crude oil supplies.

Table 1 - Some Structural Features of the Economies of Kenya, Korea, Ivory Coast and Turkey[a]

Variable	Kenya	Korea	Ivory Coast	Turkey
GDP per capita[b] ($ US)	290	980	770	1100
Trade as a percentage of gross domestic product	24.80	24.90	36.80	8.00
Role of Oil in Economic Activity				
Crude oil and oil products as a percentage of domestic production costs[c]	7.10	7.90	3.10	3.40
Domestic crude oil production as a percentage of total usage	0.00	0.00	0.00	28.40
Imports of crude oil and oil products as a percentage of total imports	23.00	19.60	5.10	11.60
Exports of oil products as a percentage of total exports	10.50	2.00	2.10	3.00
Primary Factor Intensity				
Wage share of value added	0.60	0.67	0.64	0.51
Fixed capital share of value added	0.29	0.30	0.30	0.44
Land share of value added	0.11	0.03	0.06	0.05
Occupational Composition of Workforce				
Percentage of total wage bill accounted for by;				
Formal labour	46.70	100.00[e]	64.50	85.10
Informal labour[d]	53.30	0.00	35.50	14.90
Industrial Structure of the GDP				
Share of GDP accounted for by;				
Primary production	0.37	0.24	0.34	0.28
Food processing	0.07	0.06	0.05	0.04
Textile production	0.02	0.05	0.04	0.04
Other manufacturing	0.10	0.16	0.08	0.11
Services	0.44	0.49	0.49	0.53
Commodity Composition of Exports				
Percentage accounted for by;				
Primary commodities	32.20	6.90	49.00	23.70
Processed foods	7.40	5.50	10.20	23.20
Textiles	1.80	27.60	7.80	7.90
Manufactures (includes oil products)	22.10	41.40	7.90	7.80
Other[f]	36.50	18.60	25.10	37.40
Commodity Composition of Imports				
Percentage accounted for by;				
Non-competing imports	21.00	34.90	3.80	0.00
Other primary commodities	3.10	11.60	7.80	13.90
Processed foods	3.80	1.60	14.70	1.10
Textiles	6.30	3.20	7.60	1.40
Manufactures	52.60	45.40	53.70	77.40
Other	13.20	3.30	12.40	6.20

(a) Unless otherwise indicated, figures are obtained from the input-output (IO) tables underlying the base year data which refers to years in the mid 1970's; 1976 (Kenya), 1975 (South Korea), 1973 (Ivory Coast, Turkey).
(b) Refers to 1977. (See World Bank (1980)).
(c) Calculated as the percentage of the economy's total production costs (intermediate input plus primary factor costs) represented by crude oil and oil products.
(d) Defined to include labour not subject to any explicit or implicit minimum wage restrictions, See ILO (1976).
(e) No informal labour grouping is distinguished in the Korean labour market.
(f) Includes trade margins on commodity exports.

products constitute around 20 per cent of total imports for Kenya and for Korea, 12 per cent in the case of Turkey and 5 per cent in the case of the Ivory Coast. Crude oil and oil products represent about 7 per cent of total production costs for Kenya and Korea compared with 3 per cent for Ivory Coast and Turkey.[1] The relatively low reliance of the Ivory Coast on oil products as an energy source is the reason why, although totally import dependent on oil in the period under study, oil imports are a rather insignificant proportion of total imports.

Next we see that informal labour, that is, employed labour which can be regarded as being clearly beyond any minimum wage fixing arrangements, is a particularly important component of the labour forces of Kenya and the Ivory Coast. As we go on to suggest later in the design of experiments, this type of labour has virtually no prospects for protecting its real wage in the face of increased domestic inflation. Since labour costs represent more than one half of the total production costs in all four economies, the larger the share of informal labour in total labour the greater the prospects would appear for limiting, ceteris paribus, the domestic inflationary effects of the external price increase by preventing its flow-on into money wages.

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[1] The Ivory Coast enjoys abundant supplies of hydroelectric power. Korea and Kenya however have, by international standards, comparatively oil intensive production technologies. In Korea a rapid switch towards petroleum products as a basic energy source (mainly at the expense of firewood) occurred during the rapid industrialisation phase which commenced in the early 1960's. Kenya has traditionally relied heavily on imports to meet its energy requirements.

Next we see that the differences in primary factor intensity across countries are not all that marked. Kenya is relatively more land intensive than the other economies while Turkey is relatively more fixed capital intensive. Nearly 40 per cent of Kenya's GDP is accounted for by primary production. Processing and manufacturing industries occupy the largest share of GDP in the case of Korea (27) per cent) and the lowest share in the Ivory Coast (17 per cent).

There are important differences in the commodity composition of exports and imports across countries. Primary commodity exports form a large share of total exports in both Kenya and the Ivory Coast. Processed food exports are particularly prominent for Turkey as are manufactures in the case of Korea. On the import side we note the dominant role played by non-competing imports and other primary commodities[1] (which together account for nearly one half of Korean imports) in the resource poor Korean economy. Manufactures constitute about one half of total imports for Kenya, Korea and Ivory Coast but 77 per cent in the case of Turkey.

3. Analytical Framework

The simulations reported later were obtained from country-specific multisectoral economy-wide models. Each of these models employs the same basic system of structural equations, the system however being sufficiently flexible to accommodate

[1] At the fairly high level of aggregation used in each model ,non-competing imports consist only of primary commodities.

the relevant country-specific structural and institutional features. Since the central aim of the analysis is to quantify and explain the economic implications across countries of the same exogenous world oil pricing scenario, the choice of a more or less unique model design ensures that variations across countries in response to the common shock can be attributed to economic differences across countries rather than to differences in model structure.

The country models constructed for the present study fall within the rapidly growing set of neoclassical price responsive general equilibrium models. The common features of this group of models are their construction around an input-output (IO) system of accounts and their ability to endogenise both commodity and factor prices and quantities within an equilibrium process. The model system distinguishes g domestic commodities,g import competing commodities, n non-competing import commodities,r labour occupations and h domestic activities. Table 2 contains information on the dimensions of these variables in each of the country models.[1]

Tabe 2 - Extent of Disaggregation of Country Models

	Kenya	Korea	Ivory Coast	Turkey
Domestic commodities (g)	9	10	9	10
Competing import commodities (g)	9	10	9	10
Non-competing import commodities (n)	1	5	1	0
Labour occupations (r)	2	1	3	3
Domestic activities (h)	9	10	7	10

[1]The base period IO system of accounts required for the typical country model is depicted in Appendix A.

The equations of the model system may be classified into five groups;

(i) demands for commodities (domestically produced, competitive imports and non-competitive imports) and for primary factors (labour, capital, land),
(ii) commodity supply equations,
(iii) pricing equations which impose the condition of zero pure profits in the activities (current production, capital creation, exporting and importing),
(iv) market clearing equations for domestic commodities and for primary factors, and
(v) miscellaneous equations to specify the behaviour of macroeconomic aggregates and to define useful summary variables.

In what follows we provide a schematic representation of the main equation types[1] and the parameters required to specify substitution prospects between variables in each equation. Appendix B lists the values used for these parameters in each country model.

3.1 Commodity and Primary Factor Demands

Demands for domestic commodities for use in (a) current production, (b) capital creation and (c) household consumption are represented by equations (1), (2) and (3) respectively.[2]

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[1] Vincent (1981 a) contains a complete list of the country model equations written in explicit functional form. These equations are drawn from the work of Dixon et al (1981) which provides an exhaustive algebraic treatment of the derivation of this type of equation system.

[2] In this simplified portrayal of the model we omit reference to government demands.

Current production $D_{(a)} = f_{D(a)}(Z,P_1,P_2)$ (1)

Capital creation $D_{(b)} = f_{D(b)}(Y,P_1,P_2)$ (2)

Household consumption $D_{(c)} = f_{D(c)}(C,q,P_1,P_2)$ (3)

where $D_{(a)}$, $D_{(b)}$, and $D_{(c)}$ are respectively the g order vectors of demands for domestically produced commodities in current production, capital creation and household consumption, P_1 and P_2 are g order vectors of local prices of domestic (P_1) and competing import (P_2) commodities, Z and Y are the h order vectors of industry activity levels and investment by using industry respectively, C is the g order vector of household demands for commodities and q represents the number of households.

Similarly, demands for competing import commodities in the three domestic end uses may be represented by;

Current production $M_{(a)} = f_{M(a)}(Z,P_1,P_2)$ (4)

Capital creation $M_{(b)} = f_{M(b)}(Y,P_1,P_2)$ (5)

Household Consumption $M_{(c)} = f_{M(c)}(C,q,P_1,P_2)$ (6)

where $M_{(a)}$, $M_{(b)}$ and $M_{(c)}$ are respectively the g order vectors of competing import demands in (a) current production, (b) capital creation and (c) household consumption.

Non-competing import demands can be written as;

Non-competing imports $M^N = f_{M^N}(Z)$ (7)

where M^N denotes the n order vector of non-competing imports.

Export demands are expressed as;

$$\text{Export demands} \qquad E = f_E(P_1^*, F_E) \tag{8}$$

where E and P_1^* depict the g order vectors of commodity exports and foreign currency export prices respectively and F_E is a g order vector of export demand curve shift variables.

Primary Factor demands are described by;

$$\text{aggregate labour} \qquad L_1 = f_{L_1}(Z, W_1, W_2, W_3) \tag{9}$$

$$\text{fixed capital} \qquad L_2 = f_{L_2}(Z, W_1, W_2, W_3) \tag{10}$$

$$\text{land} \qquad L_3 = f_{L_3}(Z, W_1, W_2, W_3) \tag{11}$$

$$\text{labour by occupation} \qquad L_1^u = f_{L_1^u}(L_1, W_1^u) \tag{12}$$

where L_1, L_2 and L_3 are the h order vectors of industry demands for aggregate labour (L_1), fixed capital (L_2) and land (L_3), W_1, W_2, W_3 are the respective vectors of primary factor prices and L_1^u and W_1^u are the rh and r vectors of industry labour demands by occupation and wage rates by occupation respectively.

Equations 1 - 7 and 9 - 12 are derived from standard micro-economic assumptions of cost minimisation and utility maxi-misation applied at the individual industry and household sector level. For example, equations 1 - 2, 4 - 5, 7, 9 - 12 follow from the assumption that producers choose their commodity and factor input levels to minimise the cost of producing a

given output level subject to constant returns to scale (CRTS) industry production functions of a three level or nested form. At the first level we have the Leontief assumption of no substitution between commodity categories or between them and an aggregate of the primary factors, and the non-competing imports. At the second level we have CES functions describing substitution possibilities between imported and domestic sources of each commodity category. At this level we also have CRESH[1] functions describing substitution possibilities between the three primary factors, aggregate labour, fixed capital and agricultural land. At the third level we have CRESH functions describing substitution prospects between the r labour occupations within the aggregate labour category. Equations 3 and 6 on the other hand follow from the assumption that consumers maximise their utility from a consumption bundle of commodity input categories subject to CES functions describing substitution prospects in consumption between domestically produced and imported consumer goods and to an aggregate consumer budget constraint.

Equations 1 - 6 contain activity variables (Z, Y, C, q) as well as vectors of domestically produced (P_1) and competing import (P_2) commodity prices. The extent of substitution between domestic and imported sources of supply for each end use is

[1] CRESH (Constant Ratio Elasticities of Substitution Homothetic) functions were introduced by Hanoch (1971). For a detailed treatment of their use in this type of system see Dixon et al (1981). Under CRESH, partial pair-wise elasticities of substitution can differ between pairs of factors. CRESH therefore allows for additional substitution flexibility than is the case with CES when more than two factors are involved.

described by a set of import-domestic substitution elasticities[1]. In addition to import-substitution elasticities in consumption, equations 3 and 6 contain household expenditure and cross-price elasticity parameters.[2] Equation (7) depicts a Leontief formulation of the demands for non-competing imports. As noted earlier crude oil is a non-competing import for Kenya, Korea and Ivory Coast. Export demands (8) are explained by foreign export prices (P_1^*) and shifts in the foreign demand curve (F_E). They contain parameters representing the reciprocals of the foreign elasticities of demand for each export commodity. These parameters[3], which govern the slope of the foreign demand curve for a particular country's exports, are particularly important in the case of Ivory Coast exports of cocoa and coffee (which constitute 16 per cent and 5 per cent of total world demands) and Kenyan exports of tea (which constitute 5 per cent of total world demands).

Equations (9) - (11), the aggregate primary factor demand equations, are explained only by industry activity levels (Z) and factor prices (W_1, W_2 and W_3). They contain parameters representing the industry specific pairwise substitution prospects between the three factors.[4] Similarly, equation (12),

---

[1] Our treatment of import-domestic substitution follows that of Armington (1969, 1970). See Appendix B for values of the substitution elasticities.

[2] These are derived by applying the Linear Expenditure System to estimates of household expenditure elasticities, household consumption shares and the Frisch parameter. See Appendix B for values of these components.

[3] See Appendix B for values.

[4] See Appendix B for values.

which expresses industry demands for labour by occupation (L_1^u) as a function of aggregate industry labour demands (L_1) and the vector of occupational wages (W_1^u), contains parameters to capture the ease of substitution between different occupational labour groups in each industry.[1]

3.2 Commodity Supplies

The system of commodity supply equations is depicted by (13).

Commodity supplies by industry $$X^I = f_{X^I}(Z, P_1) \qquad (13)$$

where X^I is the gh vector of commodity supplies by industry. Equation (13) is derived assuming that at a given activity level producers in each industry choose their commodity output composition to maximise their revenue subject to CRETH[2] production functions describing transformation prospects between competing commodities in production. Hence (13) contains parameters[3] determining the strength of transformation between products in the output bundle for a given percentage change in the relative prices of competing products in this bundle.

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[1] See Appendix B for details. These parameters are important in determining the effects of the exogenous shock on the occupational composition of the workforce. They are relevant only when occupational wage relativities change - as is the case in simulation B (Section 4).

[2] CRETH (Constant Ratio Elasticity of Transformation Homothetic) functions were first proposed by Dixon (1976). These allow the pairwise transformation elasticities to differ between product pairs. A summary of their properties and an illustration of their use in commodity supply analysis is given in Vincent, Dixon and Powell (1980).

[3] See Appendix B for details.

Although the dimensions of (13) allow for each industry to produce a set of each of the g commodities, multiproduct production is confined to the modern agricultural sector of the Ivory Coast model.[1]

3.3 Zero Pure Profits Conditions[2]

The first of these is represented by (14) which equates industry output prices (a function of the domestic prices of the commodities produced by that industry) to production costs which include intermediate input costs from domestic and imported sources together with labour costs and rentals on capital and land.

Zero pure profits in production $\quad V(P_1) = W(P_1, P_2, W_1, W_2, W_3) \qquad (14)$

The second equation (15) relates the price of a unit of capital creation in each industry to the cost of its creation.

Zero pure profits in capital creation $\quad \Pi = \phi\ (P_1, P_2) \qquad (15)$

---

[1] This sector consists overwhelmingly of multiproduct farms producing mainly coffee and cocoa. Technical conditions are such that farmers can alter their output mix of these products according to relative product price changes.

[2] By zero pure profits we mean that profits accrue only to factors of production. This follows from the assumption of CRTS and competitive behaviour.

where Π is the h order vector of industry costs of capital creation. Following from the assumption of CRTS industry production functions for current production and capital creation (14) and (15) contain no output variables. Equation (16) equates the revenue from exporting (right hand side) to the relevant costs (the domestic currency price).

Zero pure profits in exporting $$P_1 = \hat{P}_1^* \theta S \qquad (16)$$

where the θ is the exchange rate (domestic currency/foreign currency), S is the g order vector of one plus ad valorem rates of export subsidies, P_1^* is the vector of foreign currency export prices. The $\hat{}$ denotes P_1^* as a diagonal matrix. The final zero pure profits conditions (equations (17) and (18)) equate the selling prices of imported commodities to the cost of importing (which includes the domestic currency equivalent of the foreign currency price including the tariff).

Zero pure profits in importing (competing) $$P_2 = \hat{P}_2^* \theta T \qquad (17)$$

Zero pure profits in importing (non-competing) $$P_2^N = \hat{P}_2^{*N} \theta T^N \qquad (18)$$

In (17) and 18) P_2^* and P_2^{*N} are g order vectors of the foreign currency prices for competing and non-competing imports respectively and T and T^N are the g order vectors representing one plus the ad valorem rates of protection on competing and non-competing imports respectively.

3.4 Market Clearing

The model system contains equations which equate demand and supply for domestically produced commodities (equation 19), occupational labour (equation (20)), fixed capital (equation (21)) and land (equation (22)). These equations can be represented by

Domestic commodities	$X = D_{(a)} + D_{(b)} + D_{(c)} + E$	(19)
Occupational labour	$L_1^u = L_1^{*u}$	(20)
Fixed Capital	$L_2 = L_2^*$	(21)
Land[1]	$L_3 = L_3^*$	(22)

where X is the g order vector of domestic outputs and L_1^{*u}, L_2^*, L_3^* are respectively the rh, h and h order vectors of industry employment levels of occupational labour, fixed capital and land. Note that (20 - (22) do not necessarily impose full utilization in factor markets. We can for example set some or all factor prices endogenously and let the model determine the corresponding quantities employed.

3.5 Miscellaneous Equations

Included in this group are equations which define useful summary variables such as for example the GDP, various

[1] Land forms a (fixed) factor of production only in agricultural and mine extraction industries. In mining industries its interpretation is the orebody of the mine, which itself earns a rental. This treatment ensures that the supply curve for the industry has an upwards slope. Increased demands for minerals will therefore lead to increased mineral extraction costs.

indexing equations which allow for the exogenous setting of for example real and nominal wages, equations which aggregate variables, for example aggregating occupational labour demand to the workforce level, and equations which describe capital accumulation, rates of return and investment allocation across industries. Here we provide four examples. Equation (23) defines the balance of Trade, B, as

Balance of trade

$$B = (P_1^*)'E - (P_2^*)'(M_{(a)} + M_{(b)} + M_{(c)}) - (P_2^{*N})'M^N \qquad (23)$$

Equation (24) defines each model's consumer price index as a function of local prices of domestic and foreign goods, i.e.

Consumer price index $\qquad \Omega = f_\Omega(P_1, P_2)$ (24)

Equation (25) defines the h order vector of industry rates of return to capital as a function of the h order vectors of the rents on capital (W_2) and the costs of capital creation (Π).

Rate of return to capital $\qquad \delta R = f_R(W_2, \Pi)$ (25)

In (25) δ is a scalar representing the absolute rate of return to capital and R is a h order vector of relative rates of return to capital across industries. Hence δR is the vector of actual rates of return to capital. Finally in equation (26) we express the economy's aggregate capital stock (κ) as a function of the h order vector of industry capital stocks (k). That is,

Economy aggregate capital stock $\qquad \kappa = 1'k \qquad (26)$

where 1' is a vector of ones.

It should be noted from the absence of technical change variables in the foregoing equations that each country model assumes a fixed production technology corresponding to that given in the base year country IO tables .

3.6 Solving the Models

The solution procedure follows that pioneered by Johansen (1960). Equations are first converted to linear form by logarithmic differentiation. The model may then be represented by

$$Ax = 0 \qquad (27)$$

where A is an n x m matrix of elasticities[1], x is the m x 1 vector of percentage changes in the model's variables and n is the number of equations. After closing the model by assigning values to n - m exogenous components of x we proceed to a solution of (27) via

$$x_1 = A_1^{-1} A_2 \qquad (28)$$

where x_1 and x_2 are respectively the n - 1 and m - n x 1 vectors of endogenous and exogenous variables and A_1 and A_2 the corres-

[1] The elements of A represent functions of the various economic parameters governing for example import-domestic substitution, primary factor substitution, consumer demand and export demand behaviour and a set of coefficients representing various cost and sales shares. These latter coefficients, which depict the relative strengths of commodity-industry-primary factor linkages in the base year economy, are computed from the IO data bases. Details of the source of information for the construction of A for each country model are given in Appendix A.

ponding segments of A.[1]

4. Assumptions Underlying the Simulations

In Section 5 we present the results of simulations of the effects on key variables in each economy of an exogenously imposed increase in real world oil prices. We conduct three simulations, each of which incorporates alternative assumptions about the nature of the macroeconomic environment and the labour market in the four countries when confronted by the oil price shock. These assumptions determine the scope of adjustment countries are required to make to accommodate the oil shock. They therefore allow different interpretations to be placed on the length of the adjustment period to accommodate the shock.

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[1] Alternatively a non-linear solution algorithm could be applied to the structural equations before differentiation (see Dervis, de Melo and Robinson (1981)). The linear method has the advantage of flexibility. Different policy problems may be simulated simply by changing the partitioning of A, rather than reformulating the solution algorithm. The 'cost' however is that, because it assumes the A elements to be fixed, (28) is strictly valid only for small changes in x_2. The issue of the size of the linearisation errors introduced by (28) is an empirical one which we do not investigate in this study. Drawing on the work of Dixon et al (1981) these errors are likely to be small especially when considered in the context of the precision that can be attached to the model's data bases and parameter estimates. In that study an error-free solution of a large model of the Australian economy (whose theoretical structure forms the basis for the structure of our models) was achieved by a stepwise procedure. This involved partitioning the exogenous shock into a large number of small components and, after each Johansen solution via (28) re-evaluating $A_1^{-1}A_2$ on the basis of model projections of changes in the various cost and sales share components. The results indicated that even for large changes in exogenous variables the linearisation errors introduced by applying (28) in a one-step procedure were manageable.

The alternative macroeconomic and wage fixing assumptions are imposed simply by varying the form of model closure, that is, by shifting variables between the exogenous and endogenous variable sets, x_1 and x_2 respectively in equation (28). For each simulation, the closures are the same for the four countries. Here we first describe the size of the exogenous oil price shock driving the simulations, then discuss the model closures chosen for each simulation.

4.1. The Exogenous Shock

Our focus is on the period of the so-called second world oil price shock, 1978-1980. Between the first quarter of 1978 and the third quarter of 1980 the $US price of crude oil increased by 194 per cent. The exact size of this shock in real terms[1] depends on the deflator chosen to capture other world commodity price movements over the period. We assume, for the purpose of our simulations, a 100 per cent increase in crude oil and an 80 per cent increase in oil products[2] prices relative to the world prices of all other

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[1] Only real world price movements are relevant for the models which have nothing to say about the absolute rate of world inflation.

[2] As noted in Table 1 some countries engage in trade in oil products. The 100 /80 split is made simply on the basis that, as crude oil inputs represent about 70 per cent of oil products costs, they would be immediately passed into oil products prices. In view of the largely exogenous modelling of oil products exports (see Section 5), this assumption is of little importance to the results.

commodities.[1] The pricing scenario is imposed on the model by setting all elements in the exogenous commodity vectors representing (a) percentage changes in export demands and (b) percentage changes in world import prices, to zero except for those representing the commodities crude oil and oil products whose elements are set to 100 and 80 respectively,[2]

This shock has, depending on the relative importance of crude oil and oil products in commodity imports and exports, different implications for the immediate terms of trade decline imposed on countries. On the basis of the commodity structure of exports and imports in the base year data for each country, the world oil price shock described above is equivalent, ceteris paribus, to an initial terms of trade decline of 29 per cent for Kenya, 17 per cent for Korea, 4 per cent for Ivory Coast and 9 per cent for Turkey.

4.2 Alternative Model Closures

We generate projections for three simulations denoted

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[1] That is, real oil price increases of about 100 per cent (crude oil) and 80 per cent (oil products) are assumed. Deflating the IMF's export unit values index for oil exporting countries by the export unit values index for industrial countries for the 1978-1980 period indicates an increase of about 115 per cent in the 'real' prices of exports of oil exporting countries. From the point of view of the simulations the exact real increase is of secondary importance. Since the models are linear in percentage changes of the variables readers who wish to compute the effects of say a 110 per cent real price increase can simply multiply all results by 1.10.

[2] This treatment ignores further second round effects on the prices of non-oil commodities occasioned by the increase in oil prices. We assume that the four economies are suddenly confronted with these new world commodity price relativities.

A, B and C. We believe these simulations encompass the relevant macroeconomic conditions prevalent in these countries when confronted with the exogenous oil price increases. Simulations A and B are designed to reflect a short run adjustment horizon. Simulation C however refers to a medium run environment. The key features of the economic environment assumed for simulation A are;

(i) fixed industry specific capital stocks,

(ii) a slack labour market for all occupations with fixed money wages,

(iii) fixed aggregate domestic absorption (real aggregate consumption, investment and government spending),

(iv) a fixed nominal exchange rate.

Assumption (i) indicates that the simulations are short run. The adjustment period allows for local commodity prices to adjust to the higher world oil prices, for domestic producers and consumers to adjust their purchases of imported and domestically supplied commodities and for domestic producers to change their labour force and scale and commodity composition of output with their existing plant. Industry investment takes place but is not allowed to augment capital stocks in the solution period. Assumption (ii) implies that the labour market is demand determined. Employers can hire as much labour as they like at the going money wage. Assumption (iii) implies that the simulations abstract from any effects which the higher world oil prices may have on the level of real domestic absorption in each country. Its short run level is regarded as determined independently (by fiscal and monetary policy for example not modelled in this system) of

short run increases in real world oil prices. Given the short run exogeneity of industry capital stocks (and of the supply of agricultural land) the endogenisation of employment is equivalent to the determination of real GDP. With GDP representing the sum of absorption and the balance of trade and the former treated exogenously, the balance of trade is thus endogenous. Assumption (iv) fixes the numeraire. That is, each country model endogenises the ratio of the domestic cost level relative to the foreign currency price of traded goods. The models have nothing to say however about how the projected movements in this ratio are partitioned into changes in the exchange rate on the one hand and changes in the domestic rate of inflation on the other.[1,2]

Simulation B differs from A only in its treatment of wages. In A world oil price increases are allowed, via their effects on domestic prices in each country, to reduce real wage rates for all occupations. This assumption may however be somewhat unrealistic, at least with respect to 'organised' workers who, by concerted action can often preserve their real wages in the face of increases in the domestic price level. In order to capture the economy-wide implications of such labour market behaviour experiment B assumes that real wages of workers employed in the 'formal' sector of the economy are held constant, that is, fully indexed to the domestic consumer price

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[1] That is, each model determines movements in the real exchange rate between the country concerned and the currency in which foreign currency prices are denominated.

[2] Implicit is the assumption that the monetary authorities control the money supply during the adjustment period such that it is sufficient to meet the economy's real transactions.

level. Money wages of workers employed in the 'informal' sector remain exogenous however.[1]

Simulation C differs substantially from that of A and B. Only (iv) above continues to hold. The industry specific capital fixity assumption of (i) is abandoned. Capital mobility between industries in the domestic economy is imposed by exogenising the vector of relative rates of return to capital. The underlying assumption is that changes in these relativities induced by the higher oil prices are eliminated by capital mobility between domestic industries.[1] The second feature of C compared with A and B is the exogenous determination of aggregate labour demand and the endogenous determination of the wage level. Underlying this is the assumption that, over the medium term, world oil price increases do not have any necessary implications for the real wage-aggregate employment mix. They do however have implications for the real wage level at a given level of employment. The third distinguishing feature of C compared

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[1] See Table 1 for an indication of importance of formal labour in the labour forces of each country.

[2] The aggregate capital stock remains fixed however with the absolute rate of return to capital adjusting endogenously to achieve this. That is, barriers to capital mobility are envisaged as preventing domestic rates of return equilibrating with world rates. An alternative would be to exogenise the absolute rate of return and endogenise the aggregate capital stock. The paradigm justifying this takes the supply prices of capital for investment as being given on world markets. Following the exogenous shock relative industry growth rates are such that domestic rates of return are once again in line with world rates in the model's solution equilibrium. The mechanism assumed to achieve this is the international flow of capital. We judge the first alternative to be more appropriate for the countries under consideration.

with A and B is the assumption of endogenous real domestic absorption with the relevant variable set exogenously being the balance of trade. The model thus determines the change in absorption needed to accompany the higher world oil prices to avoid a deterioration on the balance of trade.[1] That is, the economy is forced to undertake the necessary internal resource adjustments to achieve external balance.[2]

Our final comment concerns the modelling of the oil sector in each economy. Exploratory simulations indicated that the models did not provide a plausible explanation of short and medium run domestic crude oil production response (relevant only for Turkey) and oil products export response (Korea, Kenya, Turkey) to the big increase in real world oil prices. For domestic production (Turkey) the key ingredient is the slope of the domestic supply curve for crude oil. Because insufficient evidence is available to determine this slope, domestic crude oil output for Turkey was held constant, that is, not allowed to respond to the higher world oil prices. For oil products exports the crucial factor underlying export response is the relationship between production costs (of which crude oil is the major component) and world oil products prices. In view of the arbitrariness of the 100/80 world price assumptions, exports of oil products were held fixed

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[1] For each country we have assumed balanced trade in the base period by ignoring in the choice of weights in the country balance of trade equations, deficits or surpluses that may have been present in the base year IO tables. Hence in experiment C, the percentage change in exports is forced to equal the percentage change in imports to restore each economy to balanced trade.

[2] This reflects the view that continued external financing of a balance of trade deficit is not a viable policy option over the medium term.

in all simulations for Korea, Turkey and Ivory Coast and in simulation C for Kenya[1]. The exogenous treatment of these variables is of little consequence to the overall results.

5. A Comparison of Results Across Countries

Table 3 contains projections for key macroeconomic variables for each country and for each experiment. Table 6 does likewise for a selection of microeconomic variables which includes industry outputs and commodity exports and imports. It is important to emphasise that the numbers in these tables represent merely projections of the effects of the postulated changes in world oil prices on these variables. Each country model is assumed to be initially in a state consistent with the structural system that gave rise to A in (27). The projections represent the percentage changes in endogenous variables after an adjustment period long enough[2] for the shocks to work their way through the economy.[3] They are conditional on the numerous theoretical and parameter assumptions together with the assumptions implied in the

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[1] Oil products are a very minor share of exports for Korea, Turkey and Ivory Coast. For Kenya however they represented 11 per cent of total exports in the data base, hence their endogenous treatment in A.

[2] The extent calendar time interpretation of this period is somewhat vague. We postulate a period of about two years to accommodate the adjustments required to be made by the short run closures A and B and a period of five years to accommodate the adjustments required by the medium run closure of C.

[3] The approach is one of comparative statics. We generate and compare new equilibrium solutions from a framework which ignores leads, lags and adjustment dynamics.

exogenous setting of key variables. For example the figure in line 1 column 1 of Table 3 indicates that real GDP in the Ivory Coast would be 2.31 per cent lower at the new equilibrium than it otherwise would have been at the same point in time had the oil shock not occurred. We first discuss the macroeconomic results in some detail, commencing with the short run simulations A and B. We then turn to the medium run simulation C. Finally we make some cursory comments on the general pattern of industry and commodity results in each of the three simulations.

5.1 Macroprojections: Simulations A and B

The general pattern of results is much the same for each country. The world oil price increases feed into each economy as higher domestic prices for crude oil and oil products and production costs for all industries through intermediate input linkages. The increase in domestic inflation in each country, as measured by the consumer price index, leads to a deterioration in the international competitiveness of export and import competing industries.This is reflected in a decline in aggregate exports, an increase in aggregate imports and a movement towards balance of trade deficit. With fixed real domestic absorption this in turn implies a decline in real GDP and a reduced labour demand at the going wage rate. Thus we see that in simulation A (fixed money wages in all occupations) the models project the world oil price shock to have caused short run balance of trade deficits of around 2 per cent of base

Table 3 - A Comparison of Projections Across Countries for Selected Macro Variables[a)]

Variables	Short Run (A)				Short Run (B)				Medium Run (C)			
	Ivory Coast	Kenya	Korea	Turkey	Ivory Coast	Kenya	Korea	Turkey	Ivory Coast	Kenya	Korea	Turkey
Real GDP	- 2.31	- 7.24	- 6.12	- 2.05	- 2.81	- 7.77	- 8.15	- 3.16	- 1.84	- 5.06	- 4.41	- 1.29
Aggregate Real Absorption	O(Ex)[b]	O(Ex)[b]	O(Ex)[b]	O(Ex)[b]	O(Ex)[b]	O(Ex)[b]	O(Ex)[b]	O(Ex)[b]	- 1.84	- 5.06	- 4.41	- 1.29
Money Wage (Formal Sector)	O(Ex)[b]	O(Ex)[b]	O(Ex)[b]	O(Ex)[b]	1.02	1.73	8.04[c]	2.30	- 2.02	- 4.67	-11.09	- 2.83
Money Wage (Informal Sector)	O(Ex)[b]	O(Ex)[b]	c	O(Ex)[b]	O(Ex)[b]	O(Ex)[b]	c	O(Ex)[b]	- 2.02	- 4.67	c	-2.83
Real Wage (Formal Sector)	- 0.91	- 1.57	- 3.44	- 1.80	O(Ex)[b]	O(Ex)[b]	O(Ex)[b,c]	O(Ex)[c]	- 2.28	- 3.97	- 7.71	- 2.75
Real Wage (Informal Sector)	- 0.91	- 1.57	c	- 1.80	- 1.02	- 1.73	(c)	- 2.86	- 2.28	- 3.97	c	- 2.75
Domestic Consumer Price Index	0.91	1.57	3.44	1.80	1.02	1.73	8.04	2.86	0.26	- 0.70	- 3.38	- 0.08
Aggregate Labour Demand (Employment)	- 1.79	- 5.51	- 2.58	- 2.11	- 2.66	- 6.11	- 5.64	- 4.60	O(Ex)[b]	O(Ex)[b]	O(Ex)[b]	O(Ex)[b]
Aggregate Exports (foreign currency value)	- 1.75	-11.71	- 7.60	-14.51	- 3.34	-14.08	-17.51	-28.68	3.54	18.00	19.34	10.83
Aggregate Imports (foreign currency value)	4.54	17.49	16.98	11.07	4.31	17.25	15.22	10.83	3.54	18.00	19.34	10.83
Balance of Trade (exports-imports) percent of base year GDP)	- 2.31	- 7.24	- 6.12	- 2.05	- 2.81	- 7.77	- 8.15	- 3.16	O(Ex)[b]	O(Ex)[b]	O(Ex)[b]	O(Ex)[b]

a) All projections are in percentage changes.

b) O(Ex) denotes exogenous setting to zero of the variable.

c) There is no 'formal-informal' disaggregation of the labour market for Korea.

period GDP for Turkey and Ivory Coast to around 6 to 7 per cent of base period GDP for Korea and Kenya. Since real absorption is assumed constant this is reflected in real GDP reductions of the same amount. Associated with these GDP declines are reductions in aggregate labour demands of around 2 per cent (Turkey, Ivory Coast) to 2.5 per cent (Korea) to 5.5 per cent (Kenya).

Comparing the results between A and B for each country we see that when domestic price increases following from the higher world oil prices are allowed to flow into money wages in the domestic economy the effects of the oil price shock on the domestic price level are greatly exaggerated. This leads to a more severe decline in the international competitiveness of the traded goods sector which results in a worsening balance of trade deficit and a larger fall in real GDP and aggregate labour demand. The relative deterioration in economic performance between A and B is greatest for Korea and Turkey.[1]

We now focus more closely on the reasons underlying the considerable variations in projections across countries. We concentrate on explaining these variations in the case of the simulation A results. Variations in aggregate employment across countries can be explained by variations

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[1] We see from Table 1 that wages of formal workers comprise 100 and 85 per cent respectively of aggregate labour costs in Korea and Turkey compared with 65 per cent in the Ivory Coast.

in GDP and in the labour intensity of production. Variations in GDP in turn result from variations in the extent of the balance of trade deficit and the share of GDP represented by trade. Variations in the balance of trade deficit follow from (i) variations in the responsiveness of export quantities to the deterioration in international competitiveness of export industries, (ii) variations in the extent to which export contractions are offset by increased foreign currency export prices and (iii) variations in the responsiveness of imports to the deterioration in the international competitiveness of domestic import competing industries and variations in the change in the size of the domestic market they supply. The key factor governing the size of the domestic cost-world price squeeze imposed on the traded goods sector is the increase in the domestic price level (ω) in each country. It is therefore logical that we first discuss cross-country variations in the projections for this variable.

We see from Table 3 that the increase in the domestic consumer price level ranges from 0.9 per cent (Ivory Coast), 1.6 per cent (Kenya), 1.8. per cent (Turkey) to 3.4 per cent (Korea). We note from Table 1 that the share of the economy's production costs represented by crude oil and oil products is highest for Korea (7.9 per cent) followed by Kenya (7.1 per cent), Turkey (3.3 per cent) and Ivory Coast (3.1 per cent). This ranking is not exactly that followed by the ranking of projections of ω across countries. It is of interest to look at the component parts of the consumer price level projections.

The projection for ω in Table 3 is computed as a weighted sum of the percentage changes in local prices of domestically produced and imported commodities where the weights are commodity shares in aggregate household expenditure. Alternatively ω can be arrived at as

$$\omega = W_e p_e + W_m p_m + W_d p_d \qquad (29)$$

where W_e, W_m and W_d are respectively the shares in aggregate household expenditure represented by expenditure on exportables, importables and domestic oriented goods,[1] and p_e, p_m and p_d are the percentage changes in the corresponding prices of these three types of commodities. Table 4 presents values for the W's and p's. The W's are drawn from the data bases of each model and the p's are appropriately weighted averages of the projected prices for commodities within the 'exportables', 'importables' and 'domestics' groups. Since in all economies the export sector contracts in the face of the domestic cost-world price squeeze imposed on it by the oil shock, variations in the projections for

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[1] The distinction between exportable and domestic goods is determined by the model user who has the option to endogenise exports of a particular commodity (in which case the corresponding export subsidy variable is exogenous) or exogenise exports (in which case the corresponding export subsidy is endogenous.Since exports take place according to the differential between world prices and domestic production costs the model is allowed to explain exports in each country for those commodities whose link to exports is such that their domestic currency prices can be regarded as being set by their corresponding world prices. The percentage change in exports for non-export commodities (those with only a small proportion of sales passing to exports) is set to zero. In such cases as can be seen from the endogenous determination of the corresponding element of S in (16), domestic prices are set by domestic production costs and not by world prices.

p_e across countries depend on variations in the elasticity of commodity exports with respect to price increases (i.e. on the slopes of the foreign demand curves for export commodities (see Appendix B). Variations in p_m projections across countries depend only on variations in the share of household consumption expenditure represented by expenditure on imported oil products (local prices of imports for all other consumer goods are zero). Finally, variations in p_d depend on variations in domestic cost increases across countries, the main determinants of which are variations in the oil share of costs (Table 1) the rentals earned on the fixed factors (capital and land) and the shares of intermediate inputs and capital and land rentals in total costs.[1]

Table 4 is particularly revealing. It shows that price increases for exportables constitute the major part of the increase in domestic prices for Kenya (97 per cent) and Turkey (50 per cent).In Korea however 90 per cent of the domestic price index increase is due to domestic sources while in Ivory Coast the figure is nearly 60 per cent.

Moving to the projections of the balance of trade components we see from Table 5 that the elasticities of aggregate foreign currency exports and imports with respect to a unit increase in the domestic price index differ substantially across countries.

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[1] Recall that in experiment A money wage costs are assumed constant. Hence, other things being equal, domestic industries that are labour intensive suffer lower cost disadvantages from the oil shock.

Table 4 - Decomposition of Domestic Price Index Projections (Simulation (A) into Exportable, Importable and Domestic Components.

Component		Kenya	Korea	Ivory Coast	Turkey
Exportable	W_e	0.85	0.28	0.51	0.83
	p_e	1.78	1.31	0.37	1.08
Importable	W_m	0.09	0.03	0.26	0.02
	p_m	0.32	0.00	0.80	13.27
Domestic	W_d	0.06	0.69	0.23	0.14
	p_d	0.12	4.44	2.23	4.30
ω (calculated via (29)		1.55	3.44	0.91	1.80
ω (model result)		1.57	3.44	0.91	1.80

Table 5 - Elasticity of Aggregate Foreign Currency Exports and Imports With Respect to a Unit Increase in the Domestic Price Level Following the Oil Shock (Simulation A).

	Kenya	Korea	Ivory Coast	Turkey
Percentage change in foreign currency exports/percentage change in domestic consumer price index	- 7.46	- 2.21	- 1.92	- 8.06
Percentage change in foreign currency imports/percentage change in domestic consumer price index	11.14	4.94	4.99	6.13

Aggregate foreign currency exports are more sensitive to deteriorations in the international competitiveness of export industries following the oil price increase for Kenya and Turkey than is the case with Korea and Ivory Coast. The explanation for these differences lies in the different cost structures across countries in the industries producing export commodities. In Kenya, Ivory Coast and Turkey, exports originating from the Services sector form a significant part of total exports and therefore are determined endogenously.[1] These exports are relatively intensive in their use of oil products (oil products constituting around 5 per cent of total costs in these industries) and, in the case of Kenya and Ivory Coast, in their use of other purchased intermediate inputs compared to other export industries. They therefore suffer relatively large domestic cost increases which are not compensated for by increases in the selling prices of their products. The result is a relatively large contraction in these exports which makes a major contribution to the negative elasticity of foreign currency exports to increases in the domestic cost level. For Ivory Coast the other major export industries are relatively small users of oil products. In the Modern Agriculture industry for example whose products coffee, cocoa and 'other' constitute over 21 per cent of total exports, oil products costs represent only 0.9 per cent of total costs. Further, this industry is very labour intensive (42 per cent of total costs). With

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[1] Given the fairly high level of aggregation of domestic production the services sector in several countries is shown as containing substantial exports. In Kenya, Ivory Coast and Turkey these exports consist of items whose export levels were judged to be sensitive to the oil price increase, hence their endogenous determination.

wages assumed fixed in money terms the industry suffers only a slight deterioration in its international competitiveness. For Korea[1], export industries are, on average, a little less oil products intensive than is the case for Kenya.

Next we note from Table 5 that the elasticity of aggregate imports (foreign currency cost) with respect to a unit increase in the domestic price level is greatest for Kenya followed by Turkey, Korea and Ivory Coast. The major factor underlying these differences is variations across countries in the share of foreign currency import costs represented by costs of importing crude oil and oil products. We note from Table 1 that this share is highest for Kenya (22 per cent of total imports costs) and lowest for Ivory Coast (5.1 per cent). However it is higher for Korea (19.6 per cent) than Turkey (11.6 per cent). The reason for the reduced overall sensitivity of imports to the domestic price level increase for Korea (from that suggested by a simple cross-country comparison of oil import shares) lies in Korea's high reliance on non-competing raw materials (in

[1]Furthermore, the simulation assumes constant exports for several industries which, although principally import competing, do engage in a small amount of exporting. This exogenous treatment tends, other things being equal, to lower the overall elasticity in Table 5. (The model system cannot satisfactorily endogenise both export and import activities within the same sector).

addition to crude oil) in its total imports.[1]

Having explained variations in foreign currency export and import response across countries we can explain the resultant variations in GDP solely in terms of variations in the openness of each economy to trade. Thus for example although the absolute value of the difference in foreign currency value of imports and exports is roughly the same for Kenya (29.2 per cent) as for Turkey (25.6 per cent) the resultant GDP contraction for Kenya is about three times that for Turkey (we see from Table 1 that the share of trade in GDP for Kenya is approximately three times that for Turkey). Finally, variations in the aggregate employment results follow from variations in the pattern of industry

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[1] The model's competing import demand equations are given by:

$$x^{(k)}_{(i2)j} = \underset{\substack{\text{(scale}\\ \text{effect)}}}{z_j} - \underset{\text{(import substitution effect)}}{\sigma_i^{(k)}\left(p_{(i2)} - \sum_s S^{(k)}_{(is)j} p_{(is)}\right)} \qquad (30$$

where $\sigma_i^{(k)}$ is the elasticity of substitution between imported and domestic good i when used for purpose k, $p_{(is)}$ is the percentage change in the price of good i from source s (s = 1 (domestic), s = 2(imports)) and $S^{(k)}_{(is)j}$ is the share of the total usage of good i in industry j for purpose k (current production, capital creation, consumption) represented by good i from source s. The z_j, which can be thought of as a scale effect, is negative while the second component of (30), which can be thought of as a substitution effect, is positive (domestic goods are less competitive against imports). For non-competing imports however the import substitution effect does not apply. Hence as a result of the large share of Korean imports that are non-competitive (See Table 1) the size of the positive elasticity in Table 5 is reduced.

output results, the labour intensity of production in each industry and the relative importance of industries in the GDP.[1,2]

5.2 Macroprojections: Simulation C

Again the general pattern of results is much the same in each country. Since all countries are net importers of oil to various degrees the initial effect of the higher foreign currency cost of imported crude oil is to push the balance of trade towards deficit.[3] Given however the imposed assumptions of a constant balance of trade and constant employment, this tendency towards deficit must be eliminated by a reduction of the domestic price level relative to world prices sufficient to cause a redirection of resources from the domestic to the international account. As noted earlier the model has nothing to say about whether the return

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[1] Since both land and capital are assumed fixed we may write that;

$$\mu_j = z_j / S_j^{\ell} \qquad (31)$$

where z_j and μ_j are respectively the percentage changes in industry j's activity level and its employment of labour and S_j^{ℓ} is the share of labour costs in industry j's primary factor costs. The percentage change in aggregate employment is simply an appropriately weighted sum of the percentage changes in employment in each industry.

[2] Note that aggregate labour demand in Turkey falls by more than the fall in real GDP. This result, which at first glance seems somewhat unexpected, comes about because of the heavy concentration of labour in the severely contracting sectors of the economy.

[3] The oil shock implies initially a 29 per cent decline in the terms of trade facing Kenya, a 17 per cent decline in the case of Korea, a 9 per cent decline for Turkey and a 4 per cent decline for Ivory Coast.

to balance of trade equilibrium comes about via lower domestic inflation (reflecting for example the deflationary effects of a reduced money supply) or by an exchange rate devaluation, or by both[1]. Whatever the combination of these two methods the effect is to increase the prices of tradeable goods relative to the prices of non-tradeables. The competitive position of the traded goods sector is therefore enhanced. The redirection of resources is accompanied by a fall in the level of domestic absorption which reflects the reduced terms of trade confronting each country. This decline in the terms of trade is reflected in a reduction in the productivity of domestic labour which is translated into lower real wages at the constant employment level. Thus we see that the domestic consumer price index falls for Kenya, Korea and Turkey and rises only slightly for Ivory Coast.[2] Real absorption contracts by between 4 and 5 per cent in Kenya and Korea, the two countries for which the initial terms of trade loss associated with the oil price shock is greatest, 1.8 per cent in Ivory Coast and 1.3 per cent in Turkey. The reason why the real absorption contraction is less for Turkey than for the Ivory Coast even though the former suffers a higher initial terms of trade decline from the oil price shock lies in the Turkish economy's relatively high insulation from world trade.

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[1] Alternatively domestic inflation could increase provided that it was compensated for by an even bigger devaluation. It is the net effect that is relevant.

[2] The increase in the consumer price index for Ivory Coast is less than the increase in world prices. That, is the domestic price level has fallen relative to the world price level.

Next we see that the fall in real wages required to maintain employment is 7.7 per cent for Korea, 4.8 per cent for Kenya, 2.8 per cent for Turkey and 2.3 per cent for Ivory Coast. When projections for this variable are considered in conjunction with the GDP projections it is clear that the reduced national income in each country is distributed amongst the factors of production in different ways. In Kenya for example the fall in real wages is slightly less than the fall in real GDP indicating that labour's share of national income has risen. The reason lies in the slightly higher concentration of the economy's labour in the rapidly expanding sector Agriculture (which produces coffee and tea for export) than in the contracting sectors. Agriculture accounts for one third of the economy's GDP and 35 per cent of its total wage bill. In accordance with the theorem of Samuelson and Stolper the real reward accruing to the factor (labour) employed most intensively in the relatively expanding part of the economy increases its income share. In Korea, Ivory Coast and Turkey labour's share of aggregate income falls. For Korea labour is concentrated much more heavily and for Ivory Coast, a little more heavily, in the contracting sectors of the economy than in the expanding sectors. For Turkey the comparatively large reduction in labour's share of income is required to facilitate the flow of rents in the economy to the 'factor' crude oil.[1]

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[1] An implication of our fixing of the output of the domestic crude oil industry in the face of the increase in domestic crude oil prices is that the rentals accruing to the crude oil itself are rapidly increased.

5.3 Industry Outputs and Commodity Exports and Imports (Simulations A, B, C)

Projections for these variables are given in Table 6. Although the sector and commodity classifications differ somewhat across countries the results have been aggregated within countries to conform with a common classification.[1] For reasons of space we are unable to provide an interpretation of individual projections.[2] Nevertheless, some general observations can readily be drawn. In simulation A the industrial composition of the GDP, as indicated by the pattern of industry output projections, shifts away from the export oriented sectors[3] and to a lesser extent the import-competing sectors towards those sectors whose sales orientation is more concerned with the domestic economy. Hence commodity exports contract and competing imports expand or contract depending on the relative strengths of the (negative) scale effect of the declining domestic market and the (positive) substitution effect of the reduced competitiveness of domestic industries towards import competition. Non-competing imports contract in line with the contracting outputs of the generally export oriented processing industries who purchase these imports.

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[1] Appendix B lists the sectors and commodities of each country model.

[2] See Vincent (1981 b) for a detailed analysis of the causal mechanisms underlying individual industry output and commodity export and import response for Korea.

[3] Those sectors who export directly a large proportion of their output or supply a large proportion of their sales to other export industries.

Table 6 - Industry Output and Commodity Export and Import Projections (Major Sectors)

(Simulations A, B, C)

Variables	Short Run (A)				Short Run (B)				Medium Run (C)			
	Ivory Coast	Kenya	Korea	Turkey	Ivory Coast	Kenya	Korea	Turkey	Ivory Coast	Kenya	Korea	Turkey
Outputs												
1) Traditional	0.04	0.08	(i)	(i)	- 0.01	0.06	(i)	(i)	0.06	- 2.60	(i)	(i)
2) Agriculture	- 0.30	- 1.13	- 0.28	- 0.45[d]	- 0.58	- 1.59	- 2.25	- 2.20[d]	2.56	4.72	0.22	1.90[d]
3) Mining	- 2.03[a]	-17.13	- 3.86	- 2.97[f]	- 3.01[a]	-18.23	- 8.02	- 2.95[f]	- 0.10[a]	-36.50	1.08	- 1.50[f]
4) Food processing	- 0.87	- 3.50	- 2.25	- 1.17	- 1.19	- 4.01	- 6.07	- 3.25	0.33	2.08	2.68	2.62
5) Textiles	- 1.42[b]	- 2.99[b]	- 6.06	- 0.93	- 2.10[b]	- 3.60[b]	-13.94	- 2.76	- 0.55[b]	- 2.93[b]	22.89	1.30
6) Light manufacturing	-	- 5.56	-14.03[c]	-	-	- 6.23	-26.44[c]	-	-	- 3.82	10.73[c]	-
7) Petroleum products	-	-17.33	- 1.04	0.84	-	-17.62	- 3.14	0.62	-	- 2.81	1.22	4.89
8) Other manufacturing	- 1.01[h]	- 6.56	- 6.51	- 0.26	- 1.40[h]	- 7.20	-11.84	- 0.76	- 1.45[h]	- 6.55	2.02	- 0.75
9) Services	- 1.94	- 7.22	- 0.68	- 1.60	- 2.87	- 8.24	- 1.11	- 2.76	- 0.75	- 1.96	- 2.74	- 1.00
Exports												
2) Agriculture	- 0.12	- 1.44	O(Ex)[j]	- 5.66[d]	- 0.39	- 2.6	O(Ex)[j]	-22.4[d]	3.87	19.18	O(Ex)[j]	15.94[d]
3) Mining	- 2.18[a]	-49.81	O(Ex)[j]	-33.64[h]	- 3.24[a]	-51.62	O(Ex)[j]	-51.66[h]	0.00[a]	-	O(Ex)[j]	-19.77[g]
4) Food Processing	- 2.96	-13.90	-35.13	-11.81	- 3.87	-15.86	-90.27	-25.52	3.62	30.55	71.16	19.69
5) Textiles	- 3.04[b]	-18.61[b]	-10.81	-18.55	- 4.32[b]	-21.96[b]	-25.09	-37.78	0.54[b]	17.65[b]	44.04	18.95
6) Light manufacturing	-	-17.67	-24.42[c]	-	-	-19.29	-46.14[c]	-	-	- 0.44	21.21[c]	-
7) Petroleum products	-	-34.48	O(Ex)	O(Ex)	-	-33.93	O(Ex)	O(Ex)	-	O(Ex)	O(Ex)	O(Ex)
8) Other manufacturing	O(Ex)[h]	-21.45	-17.89	O(Ex)[j]	O(Ex)[h]	-22.88	-32.22	O(Ex)[j]	O(Ex)[h]	-16.58	10.93	O(Ex)[j]
9) Services	-10.11	-35.78	O(Ex)	-32.03	-14.64	-40.79	O(Ex)	-50.91	3.12	10.99	O(Ex)	- 0.93
Imports (Competing)												
2) Agriculture	- 0.60	- 1.78	1.73	0.56[d]	- 0.75	- 1.48	8.85	1.95[d]	- 1.55	-12.58	-10.64	- 1.55[d]
3) Mining	- 0.65[a]	- 4.71	- 3.66	0.08[e]	- 0.88[a]	- 5.30	- 0.68	- 0.30[e]	- 1.40[a]	- 1.17	- 8.14	3.00[e]
4) Food processing	0.50	0.66	0.05	0.09	0.56	0.75	- 1.53	0.39	- 1.82	- 6.94	- 3.03	- 0.06
5) Textiles	0.17[b]	- 0.43[b]	- 3.89	0.12	0.14[b]	- 0.59[b]	- 8.44	- 0.58	- 1.39[b]	5.62[b]	10.40	0.13
6) Light Manufacturing	-	- 3.42	- 3.71[c]	-	-	- 3.90	- 7.47[c]	-	-	- 4.17	4.02[c]	-
7) Petroleum Products	-	- 6.21	-15.83	-33.17	-	- 7.08	-15.79	-34.68	-	- 0.47	-19.66	-39.95
8) Other manufacturing	- 1.08[h]	- 2.79	- 3.63	0.23	- 1.40[h]	- 3.13	- 7.16	- 0.03	- 1.80[h]	- 4.59	2.78	- 0.69
Imports (Non-competing)												
1) Crude Oil	- 1.08	-17.33	- 1.04	-	- 1.40	-17.62	- 3.14	-	- 1.45	- 2.81	1.22	-
2) Other	-	-	- 5.81	-	-	-	-11.33	-	-	-	7.50	-

Notes: a) Includes timber extraction.
b) Includes leather products.
c) Consists of rubber products.
d) Includes cotton ginning.
e) Includes crude oil which is a competing import for Turkey.
f) Includes crude oil, coal and other mining for Turkey.
g) Exports in mining include only other mining. Coal and crude oil are not exported.
h) Includes oil products.
i) Not relevant in Korea and Turkey.
j) Sector is predominantly import-competing. Exports small therefore set to zero.

In B the pattern is much the same though exaggerated. In C the pattern is reversed. The industrial composition of the GDP shifts in favour of traded (export and import-competing) sectors at the expense of the more domestically oriented industries. Commodity exports increase. Competing imports are less competitive against domestically supplied goods.

Further, the market they supply falls in most cases. Non-competing imports (excluding crude oil) expand in line with the enhanced growth performance of the export-oriented processing industries.

6. Concluding Remarks

In this paper we have investigated the nature and size of the short and medium run adjustment problems imposed on four developing economies (Kenya, Korea, Ivory Coast and Turkey) by increases in real world oil prices roughly in line with those attributable to the so-called second world oil price shock of the 1978 - 1980 period. While all are net importers of crude oil and oil products, each of these countries exhibits different degrees of oil-poorness. Further, they exhibit markedly different structural characteristics.

Our quantitative projections are derived from multi-sectoral economy-wide models for each of these countries. These projections auggest that real world oil

price increases of 100 and 80 per cent for crude oil and oil products, under slack labour market conditions with money wages and real domestic absorption held constant, produce the following short run effects;

(i) reductions in foreign currency export receipts and increases in foreign currency import expenses resulting in contractions in real GDP ranging from 2.1 per cent (Turkey), 2.3 per cent (Ivory Coast), 6.1 per cent (Korea) to 7.2 per cent (Kenya),

(ii) contractions in aggregate employment ranging from 1.8 per cent (Ivory Coast), 2.1 per cent (Turkey), 2.6 per cent (Korea) to 5.5 per cent (Kenya),

(iii) increases in consumer prices ranging from 0.9 per cent (Ivory Coast), 1.6 per cent (Kenya), 1.8 per cent (Turkey) to 3.4 per cent (Korea),

(iv) a switch in the industrial composition of the GDP in all countries away from export oriented and to a lesser extent import competing industries towards the non-traded industries.

Assuming that workers in the formal sector of the workforce can maintain their real wages in the face of the oil shock then the domestic inflationary effects and consequent detrimental implications for the balance of trade, the GDP and employment are greatly exaggerated in countries where formal labour occupies a large part of the workforce.

Assuming over the medium term that each country faces a balance of trade constraint and seeks to preserve employment in the face of the oil price shock, the results indicate that real absorption cuts ranging from 5.1 per cent (Kenya), 4.4 per cent (Korea), 1.8 per cent (Ivory Coast) to 1.3 per cent (Turkey) and real wage cuts ranging from 7.7 per cent (Korea), 4.0 per cent (Kenya), 2.8 per cent (Turkey) to 2.3 per cent (Ivory Coast) will be necessary to preserve external and internal balance. Associated with these cuts is a redirection of resources from non-traded to traded sectors.

The simulations suggest that the appropriate policy package required in these countries to speed adjustment to the second world oil price shock is one which facilitates simultaneous reductions in real wages and real domestic expenditure as well as encouraging domestic resource mobility from non-traded to traded sectors. There are of course a range of fiscal and monetary instruments available to achieve this though we recognize that these policy options are hard ones and political difficulties may arise in their implementation. It is too early yet to undertake a retrospective analysis of the types of policy response to the second oil shock which have been undertaken by the four countries we have studied.

Perhaps more important than the projections themselves are the reasons underlying them. We have therefore devoted considerable space to rationalising the cross-country variations in projections in terms of variations in key economic characteristics across countries. Amongst the numerous structural features we have identified as being

important in 'explaining' country projections and whose cross-country differences contribute to an explanation of cross-country variations in projections are domestic production technology, especially oil intensity of domestic production, oil intensity of exports and imports, openness of the economy to trade, composition of consumer prices in terms of exportables, importables and non-traded commodities, primary factor intensity and the degree to which imports compete with domestic products. The justification for using applied general equilibrium analysis to tackle this type of policy issue is that it allows for the incorporation of these and many other factors within a rigorous framework of analysis.

As with all studies of an applied nature our results are conditional on the numerous assumptions underlying the economic structure of the models used. We have endeavoured, as far as is possible, to make these assumptions explicit to enable the reader to judge their relevance.

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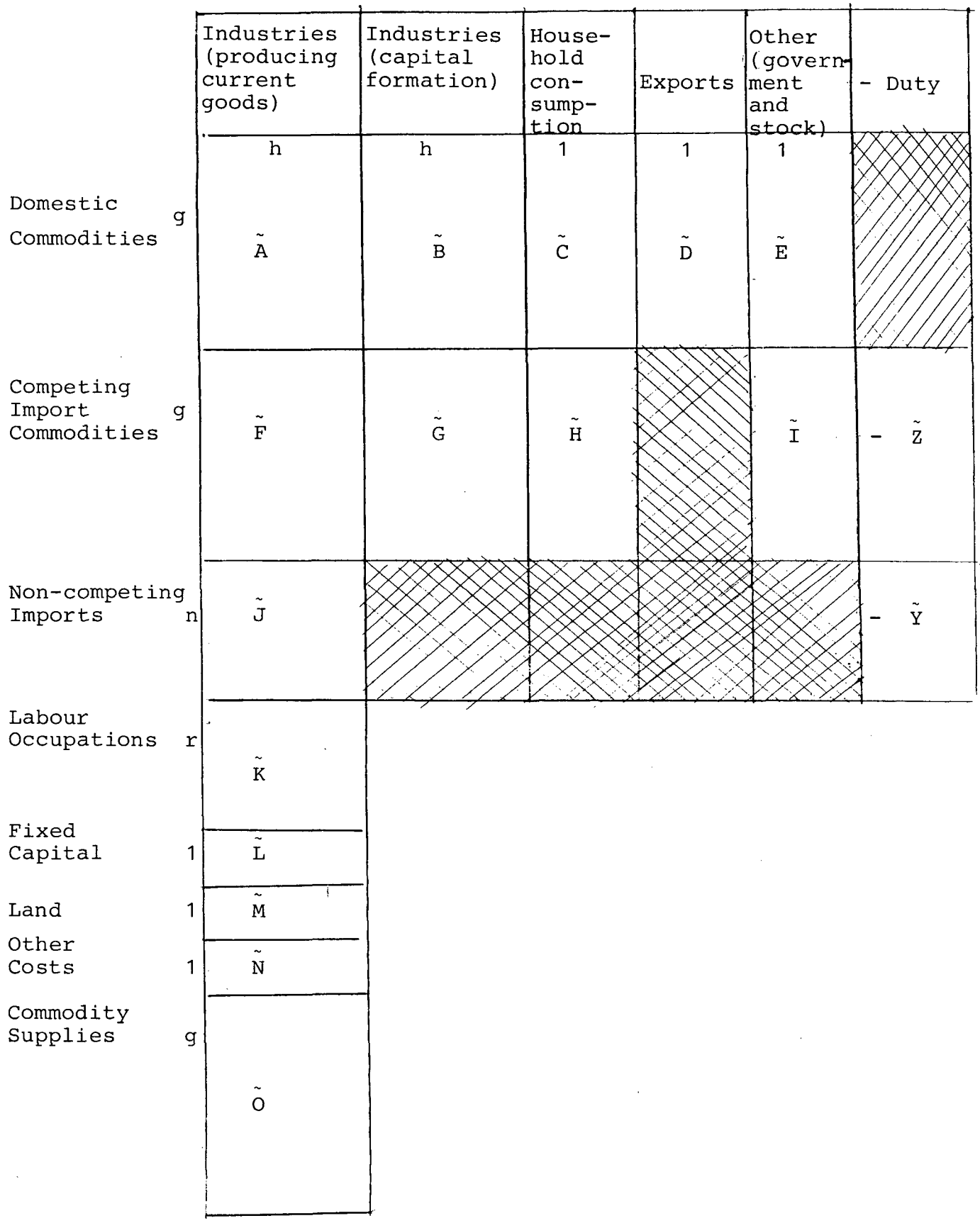
Appendix A. The Data Base Underlying Each Country Model

Figure A1 provides a schematic outline of the IO data base required for each country model. The purpose of Figure A1 is to establish the IO linkages within each economy and between each economy and overseas in the base period. These linkages enter the model as a set of share coefficients. For example, production techniques for domestic industries in producing their commodity outputs are represented by the shares in industry costs accounted for by the costs of all inputs - domestically produced commodities, competing and non-competing import commodities and primary factors. Similarly, the disposition of domestically produced and imported commodities is reflected in the sales shares of these commodities to intermediate usage, capital creation, household consumption, other (mainly government) and exports.

The column sums of the A + F + J + L + M + N matrices of Figure 1 represent the domestic outputs of each industry in base year value units. The row sums of A + B + C + D + E represent the outputs of domestic commodities. Alternatively, domestic industry outputs can be obtained as the column sums of O and domestic commodity outputs as the row sums of O. The row sums of F + G + H + I + (-Z) represent the c.i.f. value of imports of competing import commodities while the row sums of J + (-Y) represent the c.i.f. value of non-competing imports. Readers will note that Figure 1 provides no explicit recognition of the demands for margins services to facilitate the flows of goods and services in the domestic economy.Neither

Figure A1 Schematic Input-Output Data Base for a typical Country Model



does it distinguish the taxes levied on such flows.[1]

The starting point in the construction of Figure A1 is the conventional IO table published for each country. This table refers to 1976 in the case of Kenya[2], 1975 (Korea)[3], 1973 (Ivory Coast)[4] and 1973(Turkey)[5].

The data base requirements as contained in Figure A 1 differ from those provided in conventional country IO-tables in three respects;

(i) the sectoral disaggregation of commodities and industries,
(ii) the treatment of investment and other final demand categories,
(iii) the treatment of primary factor inputs.

The reorganisation of the sectoring in each country IO table required, amongst other things, that the oil sector be treated separately, and that where appropriate joint production[6]

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[1] Given the particular policy orientation of the study, the modelling of margins and taxes would seem to be of secondary importance. Furthermore, such an exercise would considerably overtax the I-O data for developing countries as well as dramatically increase the size of each country model.

[2] See Input-Output Tables for Kenya, 1976, Central Bureau of Statistics, 1979.

[3] See Bank of Korea, 1975 Input-Output Tables (II), 1978.

[4] République de Côte d'Ivoire, Ministère du Plan, Les Comptes de la Nation, 1973.

[5] See State Institute of Statistics, 1973, Inter-Industry Transactions Matrix of Turkey.

[6] The country IO tables in each case assume a 1:1 relationship between row and column sectors. That is, they do not explicitly recognize joint production.

be allowed. Next, the capital expenditure vectors distinguished in each table required disaggregation into separate columns for each investing industry. The basis for this disaggregation is a capital stocks matrix, that is, a matrix containing estimates of the quantity of inputs of each commodity in the capital stock of each industry. Finally the primary factor input rows of each IO table required disaggregation into rows representing returns to land, fixed capital and returns to labour by occupation.

Detailed information on how Figure A 1 was constructed from the country IO table and other data sources is provided in:

Gupta, Sanjeev, "Data Base and Parameter Estimates for a Multisectoral Model of the Kenyan Economy", Institute for World Economics, Kiel, 1981 (unpublished paper).

Vincent, D.P., "A Multisectoral General Equilibrium Model of the Korean Economy: Sectoral Design, Data Base and Parameter Estimates" Institute for World Economics, March 1981 (unpublished paper).

Dick, H.,"Ein allgemeines Mehrsektoren-Gleichgewichtsmodell der Elfenbeinküste: Beschreibung des Datengerüsts und Disaggregationsniveaus", Institute for World Economics, Kiel, June 1981 (unpublished paper).

Voigt, H., "Mehrsektorales Gleichgewichtsmodell der Türkei. Datenbasis", Institute for World Economics, Kiel 1981 (unpublished paper).

Appendix B. Key Parameter Settings for Each Country Model

Tables B1, B2, B3 and B4 list the values of key parameters in the model simulations for Kenya, Korea, Ivory Coast and Turkey respectively.

Table B1. Key Parameter Settings: Kenya

Commodities and Industries	Household Expenditure Elasticities (a)	Household Budget Shares (b)	Reciprocals of Export Demand Elasticities (c)	CES Capital Labour Substitution Elasticities (d)	Import Domestic Substitution Elasticities (e)	CES Substitution Elasticity between Formal and Informal Labour (f)
Traditional Economy	0.48	0.06	0.00	1.00	5.00	1.00
Other Agriculture	0.48	0.26	0.15	1.00	5.00	1.00
Mining	0.00	0.00	0.05	0.52	2.00	1.00
Food	0.55	0.19	0.05	0.78	4.00	1.00
Textiles and Footwear	1.64	0.07	0.05	0.72	2.00	1.00
Light manufacturing	1.95	0.03	0.05	0.75	1.50	1.00
Petroleum Products	1.00	0.01	0.05	0.78	0.50	1.00
Other manufacturing	1.95	0.07	0.05	0.65	0.50	1.00
Services	1.33	0.31	0.05	0.81	3.00	1.00
Frisch-parameter (g) - 6.0.						

(a) The expenditure elasticities are taken from Benton F. Massell and Judith Meyer, Household Expenditure in Nairobi: A statistical Analysis of Consumer Behaviour, in Economic Development and Cultural Change, vol. 17, 1969 pp. 212-234.

(b) Obtained from IO table for Kenya.

(c) Set to 0.05 for all commodities except Agriculture to approximate the small country assumption. For Agriculture (whose exports consist mainly of tea and coffee) a value of 0.15 was used to reflect some terms of trade power in these commodities.

(d) The capital-labour substitution elasticities for the manufacturing sector are those estimated by J.K. Maitha Capital-Labour substitution in manufacturing in a Developing Economy: the case of Kenya, Eastern Africa Economic Review, vol. 5, Dec. 1973. For the agricultural sectors, the elasticities of substitution between land, labour and capital, were set to unity for each factor pair. That is, CES rather than CRESH production technology was assumed.

(e) Assumed to be the same in all end uses (intermediate usage, investment, household consumption). The estimates were chosen on the basis of values used in other studies.

(f) Assumed to be unity for all sectors.

(g) Calculated using the GDP per capita - Frisch Parameter relationship reported in Lluch, C. Powell, A.A., and R.A. Williams, Patterns in Household Demand and Saving, Oxford University Press, 1977.

Table B2. Key Parameter Settings: Korea[a]

Commodities and Industries	Household expenditure Elasticities (b)	Household Budget Shares (c)	Reciprocals of Export Demand Elasticities (d)	CES Capital-Labour-Land Substitution Elasticities (e)	Import-Domestic Substitution Elasticities (f)
1. Agriculture and fishing	0.780	0.336	0.050	1.400	2.000
2. Mining	0.670	0.001	0.050	0.800	2.000
3. Processed foods (ex sugar)	0.783	0.184	0.050	0.800	2.000
4. Refined sugar	0.800	0.025	0.050	0.800	2.000
5. Textile products	1.333	0.090	0.050	0.800	2.000
6. Petroleum products	0.667	0.006	0.050	0.800	2.000
7. Rubber products	1.200	0.005	0.050	0.800	2.000
8. Other Manufacturing export	1.274	0.062	0.050	0.800	2.000
9. Other Manufacturing import	1.271	0.059	0.050	0.800	2.000
10. Services	1.250	0.232	0.050	0.800	2.000

Frisch parameter [b] = -3.70

(a) A detailed discussion of these parameters and the various sources of their parameter settings is given in Vincent, D. "A Multisectoral General Equilibrium Model of the Korean Economy: Sectoral Design, Data Base and Parameter Estimates," Institute for World Economics, Kiel, March 1981 (unpublished paper).

(b) Obtained from the Korean Household Study reported in Lluch, C., Powell, A.A. and R.A. Williams, Patterns in Household Demand and Saving, Oxford University Press, 1977.

(c) Obtained from Korean IO table.

(d) Set to 0.050 to approximate the small-country assumption for Korean exports.

(e) Based on estimates reported in Kim, Y.S., Factor Substitutability, Efficiency Growth and Relative Wage Income Shares in the Korean Agricultural and Manufacturing Sectors, 1955-1974, unpublished Ph.D. thesis, Michigan State University, 1977 and Nam, C., Economics of Scale and Production Functions in South Korean Manufacturing, unpublished Ph.D. thesis, University of Minnesota, 1975. CRESH production technology collapsed to CES for industries with land as a factor of production.

(f) Assumed to be the same in all end uses (intermediate usage, investment, household consumption). Estimates based on other country studies. (See Vincent, D. "A Multisectoral General Equilibrium Model of the Korean Economy: Sectoral Design, Data Base and Parameter Estimates," Institute for World Economics, Kiel, March 1981 (unpublished paper) for further details.

Table B3. Key Parameter Settings: Ivory Coast

A. Industry Parameters[a]

Industries	CES Primary Factor Substitution Elasticities[b]	Allen-Uzawa pairwise Substitution elasticities	
		between qualified and unqualified labour	between informal and formal unqualified labour
1. Traditional Agriculture	0.80	0.25	1.25
2. Modern Agriculture	0.80	0.25	1.25
3. Wood, Mining	0.80	0.25	1.25
4. Food processing	0.70	0.25	1.25
5. Textiles, Leather	0.70	0.25	1.25
6. Other Manufacturing	0.40	0.25	1.25
7. Services	0.70	0.25	1.25

(a) For a comprehensive discussion of the source of these parameters see Dick, H. "Ein allgemeines Mehrsektoren-Gleichgewichtsmodell der Elfenbeinküste: Beschreibung des Datengerüsts und Disaggregationsniveaus", Institute for World Economics, Kiel, June 1981 (unpublished paper).

(b) Calculated from information in Pegatinan, H.J. "Système et Structure du Production de l'Industrie Manufacturière, Indications pour une politique des Revenues".In: Cahiers du CIRES, No. 24-25, March-June 1980.

B. Product Parameters[a]

Products	Import domestic substitution elasticities (b)	Transformation elasticities (c)	Household expenditure elasticities (d)	Budget shares of private household consumption (e)	Reciprocals of Export Demand Elasticities
1. Traditonal Agriculture	2.00	-	0.35	0.18	0.05
2. Coffee	2.00	0.70	0.76	0.001	0.20
3. Cocoa	2.00	0.70	0.00	0.00	0.50
4. Other Modern Agriculture	2.00	0.70	0.48	0.01	0.05
5. Wood, Mining	2.00	-	0.76	0.07	0.05
6. Processed Food	2.00	-	1.10	0.23	0.05
7. Textiles, Leather	2.00	-	0.96	0.11	0.05
8. Other Manufacturing	0.00	-	1.34	0.13	0.05
9. Services	2.00	-	1.20	0.33	0.05

Frisch parameter[d] = - 3.71.

(a) For a comprehensive discussion of the source of parameters see Dick, H. "Ein Allgemeines Mehrsektoren Gleichgewichtsmodell der Elfenbeinküste: Beschreibung des Datengerüsts und Disaggregationsniveaus, Institute für World Economics, Kiel, Juni 1981 (unpublished paper).

(b) Assumed to be the same in all end uses.

(c) Multioutput-production-function in Industry "Modern Agriculture" (Products 2,3,4).

(d) Calculated using the GDP per capita-Frisch parameter relationship reported in Lluch, C. Powell, A.A., Williams, R.A., Patterns in Household Demand and Saving, Oxford University Press, 1977.

(e) Côte d'Ivoire, Ministère du Plan, Les Comptes de la Nation, Abidjan, 1973.

Table B4. Key Parameter Settings: Turkey

A. Industry Parameters[a]

Industry	CES Primary Factor Substitution Elasticities	CRESH - Substitution Parameters for Labour		
		Agricultural labour	Organised labour	Informal labour
1. Agriculture	1.00	0.20	0.20	0.20
2. Mining	0.50	-	0.40	0.00
3. Food	1.00	-	0.25	0.25
4. Textiles	1.00	-	0.35	0.25
5. Oil products	0.25	-	0.30	0.00
6. Manufacturing industry	0.75	-	0.25	0.25
7. Services	1.00	-	0.25	0.25

(a) For details of the sources of these estimates see Voigt, H., Mehrsektorales Gleichgewichtsmodell der Türkei. Datenbasis, Kiel, 1981 (unpublished paper).

B. Product Parameters[a]

Products	Household Expenditure Elasticities (b)	Household Budget Shares (c)	Reciprocals of Export Demand Elasticities (d)	Import-Domestic Substitution Elasticities (e)
1. Agriculture	0.450	0.265	0.050	2.000
2. Mining	0.500	0.005	0.050	1.650
3. Food Processing	1.000	0.135	0.050	0.650
4. Textiles	1.200	0.090	0.050	0.650
5. Oil Products	1.500	0.015	0.050	1.500
6. Manufacturing	1.030	0.150	0.050	0.500
7. Services	1.350	1.340	0.050	0.200

Frisch parameter - 1.60 [b]

(a) For details of the sources of these estimates see Voigt, H., Mehrsektorales Gleichgewichtsmodell der Türkei. Datenbasis, Kiel, 1981 (unpublished paper).

(b) Obtained from Lluch, G., A.A. Powell and R.A. Williams, Patterns in Household Demand and Saving , Oxford University Press 1977 and Gerken, E., Arbeitsmärkte in Entwicklungsländern, Kieler Studien 106, J.C.B. Mohr, Tübingen 1981.

(c) From IO table for Turkey.

(d) Set to reflect small country assumption for Turkey.

(e) Assumed to be the same in all end uses. Obtained from Dervis, K. and S. Robinson, The Foreign Exchange Gap, Growth and Industrial Strategy in Turkey: 1973 - 1983, World Bank Staff Working Paper No. 306, Washington 1978.