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**A NATIONAL INCOME ACCOUNTING FRAMEWORK
FOR THE OPEN, DUALISTIC ECONOMY**

by

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The system under discussion is one in a series of national income accounting frameworks designed to analyze growth typology as related to development planning and strategy. Three such systems were presented in an earlier working paper describing alternative models of development types or situations.¹

This paper discusses an additional system, designed for the open, dualistic economy ("small open economy"). For this purpose, accounting systems at three levels of aggregation have been developed. The discussion which follows concentrates on Level I, the most disaggregated, since this level is most useful for analyzing the development problems of the small, open economy--if, in fact, data are available for implementing this framework in actual situations (i. e., measuring and analyzing the flows depicted).

The key sector approach to growth typology and development planning, employed in our current research work, has been evolved to supplement the national income accounting systems used in developing countries. Existing national income accounts fail to explicitly measure some of the most critical relationships from a development viewpoint. The typology approach stresses reclassification of the economy's

¹Douglas S. Paauw, "A Framework for Development Planning Research: A Typology Approach," National Planning Association, Center for Development Planning, July 7, 1965.

sectors and intersectoral flows to focus attention on the key development problems confronted by economies of particular types. The national income accounting framework presented here, therefore, represents an effort to identify the key sectors and the important intersectoral relationships for the open, dualistic economy. It is our premise that application of the framework to economies of this type will provide insights to guide development planning and strategy. This task will be undertaken in subsequent papers after the framework has been applied to the Philippines and Thailand and the results have been analyzed.

I. Identification of Sectors and Intersectoral Flows

The framework for the open, dualistic economy seeks to combine dominant features of growth types studied in our earlier papers:¹ the centrality of foreign trade in the export-oriented economy models (the monomorphic agricultural economy and the differentiated agricultural economy) and the centrality of the problem of domestic dualism in the dualistic economy model. In addition, government is explicitly introduced to move in the direction of greater realism for

¹See Douglas S. Paauw and John C. H. Fei, "Development Strategies and Planning Issues in Southeast Asian Type Economies," Philippine Economic Journal, Vol. IV, No. 2, Second Semester, 1965, pp. 200-225.

analysis of government impact on the economy as a basis for considering the role of government planning and policy.

The framework for analysis of the open, dualistic economy is presented in the accompanying diagram, and the symbols employed are defined in the Appendix. The accounting system shown in this diagram consists of flows among four basic nexi and their components: the production nexus, the income disposition nexus, the foreign nexus, and the financial nexus.

The production nexus is broken down into three production sectors (industry, agriculture and government) and is associated with an income disposition nexus, similarly broken down into three income disposition sectors (industrial households, agricultural households, and government).

This gives us three domestic sectors classified into two nexi of activity, production and income disposition. In addition, there is a foreign nexus, relating domestic economic activity to the rest of the world, and a financial nexus concerned with both domestic and foreign financing of the economy's investment activities.

A. The Production Nexus

Beginning with the production nexus, the diagram shows for each production sector (1) its payments for factors of production and intermediate goods produced by other sectors--emerging from pipes at the top of the box representing each sector and (2) payments to it by other sectors purchasing its output--flowing into the bottom of each box. Value added, represented by V with the appropriate subscript, represents a production sector's payment for factors of production (V_y for the industrial production sector, V_x for the agricultural production sector, and V_g for the government production sector). Aggregating value added by the three production sectors gives us gross national product, i. e. :

$$(1) \text{ GNP} = V_y + V_x + V_g$$

Intermediate good purchases from other production sectors are shown for industry, agriculture, and government and comprise the following: (1) industrial purchases of imported raw materials (M_R); (2) industrial purchases of agricultural raw materials (R); (3) agricultural purchases of industrial intermediate goods (N); (4) government purchases of agricultural output (X_g); and (5) government purchases of industrial output (Y_g).

Purchases of output from the production nexus are shown as Y for industrial output, X for agricultural output, and G for government "output." Industrial output (Y) includes: (1) industrial exports (E_y) and (2) consumption expenditures on domestically produced industrial goods, comprising two expenditure streams. One represents purchases of industrial goods by industrial households (Y_h); and the other, purchases of industrial goods by agricultural households (Y_L). Imported industrial consumer goods (M_y), however, are subtracted from total consumption expenditures on industrial goods to obtain the domestic component; (3) investment expenditures for domestically produced capital goods (I_d); (4) government purchases of industrial output (Y_g); and (5) intermediate good purchases by the agricultural sector (N). Hence:

$$(2) Y = E_y + (Y_h + Y_L - M_y) + I_d + Y_g + N$$

A distinction is drawn between total final spending on industrial goods (Y_a) and total final spending on domestically produced industrial goods (Y_d), the difference being imports of industrial goods for consumption (M_y) and for investment (M_i); i. e. :

$$(3) Y_d = Y_a - M_y - M_i$$

Agricultural output (X) includes: (1) agricultural exports (E_x); (2) consumption expenditures on agricultural goods, broken down between industrial households (X_h) and agricultural households (X_L) and less imports of agricultural consumers goods (M_x), government purchases of agricultural output (X_g), and raw materials sold to the industrial sector (R). Hence:

$$(4) X = E_x + (X_h + X_L - M_x) + X_g + R$$

Corresponding to the industrial sector, a distinction is drawn between total final spending on agricultural goods (X_a) and final spending on domestically produced agricultural goods (X_d); i. e. :

$$(5) X_d = X_a - M_x$$

where M_x equals imported agricultural goods.

Total government output--current expenditures of government--(G) represents government provision of services for general consumption valued at government payments to factors of production (government value added V_g) plus government purchases from industry (Y_g) and from agriculture (X_g); i. e. :

$$(6) G = V_g + Y_g + X_g$$

B. The Income Disposition Nexus

Turning now to the income disposition nexus, we find that each production sector has an associated income disposition sector. In both agriculture and industry, the relationship is direct. The personal income of industrial households (P_h) comes mainly from industrial production, supplemented by government payments to industrial households (G_h); i. e.:

$$(7) P_h = V_y + G_h$$

and personal income of agricultural households (P_L) comes mainly from agricultural production, supplemented by government payments to agricultural households (G_L); i. e.:

$$(8) P_L = V_x + G_L$$

Government income, however, is obtained from tapping the two other major income streams in the form of tax revenues:

$$(9) T = T_h + T_L$$

where T equals total government tax revenues and T_h and T_L equal industrial sector taxes and agricultural sector taxes, respectively.

Taxes paid by each sector are also the difference between the sector's personal income and its disposable income. For the industrial sector, disposable income (D_h) is:

$$(10) D_h = P_h - T_h$$

and for the agricultural sector, disposable income (D_L) is:

$$(11) D_L = P_L - T_L$$

C. The Financial Nexus

We may now incorporate the financial nexus, which shows sources of savings for the finance of investment. Each domestic income disposition sector's savings equals current income less current expenditures. Beginning with the government sector:

$$(12) S_g = T - G$$

i. e., Government savings (S_g) equal tax revenues (T) less current government expenditures (G).

Savings of the industrial sector (S_h) are equal to the sector's disposable income less consumption expenditures on industrial and agricultural goods:

$$(13) S_h = D_h - (Y_h + X_h)$$

Similarly, savings of the agricultural sector (S_L) are:

$$(14) S_L = D_L - (X_L + Y_L)$$

The relationships in the financial nexus show that total domestic savings (S) comprise savings from the three sectors in the income disposition nexus:

$$(15) S = S_g + S_h + S_L$$

Total investment (I) is financed by domestic savings (S) plus foreign savings (A); i. e. :

$$(16) I = S + A$$

Investment expenditures are broken down by expenditures on domestically produced capital goods (I_d) and imported capital goods (M_i); i. e. :

$$(17) I = I_d + M_i$$

Inside the financial nexus is shown the distribution of investment goods between the industrial sector (I_y) and the agricultural sector (I_x), representing capital formation in these sectors, respectively.

D. The Foreign Nexus

Proceeding finally to the foreign nexus, three major flows are emphasized: exports (E), imports (M), and foreign savings (A).

The basic relationship among these flows is:

$$(18a) \quad M = E + A$$

i. e., imports are equal to exports plus inflow of foreign savings.

Equation 18a may also be written:

$$(18b) \quad A = M - E$$

which emphasizes the role of foreign savings in filling the gap between imports and exports.

Exports (E) are broken down into two component flows: i. e., exports of industrial output (E_y) and exports of agricultural output (E_x).

Hence:

$$(19) \quad E = E_y + E_x$$

Imports (M) are first disaggregated between imports on current account (M_c) and imports on capital account (M_i); i. e. :

$$(20) \quad M = M_c + M_i$$

Because of the importance of analyzing the import component of development, imports on current account are further disaggregated into three components: imports of raw materials (M_R), imports of industrial consumer goods (M_y), and imports of agricultural consumer goods (M_x); i. e. :

$$(21) M_C = M_R + M_y + M_x$$

II. Special Features of the Framework

In this section we emphasize several of the special features of the national income accounting framework. This is done to stress differences from more or less conventional practices and to assist the reader in understanding the system.

A. Production and Income Disposition Sectors Linked

Each of the three domestic sectors--industry, agriculture, and government--appears in both the production nexus and the income disposition nexus. Unlike other systems of national income accounting, however, each production sector has a related income disposition sector. Thus, the totality of the economy's income disposition function is broken into three income disposition sectors rather than being aggregated into one "household sector."

This is done to allow a link between each domestic sector's production and income disposition functions. Such linking is based on the assumption that in less developed countries each sector's income is primarily derived from productive activities of a given type. The link is made to emphasize the dichotomy between industrial households and agricultural households, enabling analysis of the relationship between production and income generation in these two sectors. The distinction also allows individual sector analysis of income disposition (e.g., consumption and savings behavior) in industry and agriculture.

B. Treatment of Savings and Investment

The savings-investment process--mobilization of savings and transforming them into productive capital and distribution of capital goods among producers--takes place in the financial nexus. Savings are mobilized from all three income disposition sectors as well as from abroad. The assumption about investment spending is somewhat unique; capital goods are purchased either from the domestic industrial sector or from abroad. Investment goods, therefore, are not produced by the agricultural sector or government.

The financial nexus' function of distributing capital goods created in each time period is limited to a breakdown between the

industrial and agricultural sectors. This treatment allows comparison of capital formation and savings by these sectors to determine net outward or inward transfers of savings. Sectoral transfers of savings are a key factor in the development process.

As we note below, the industrial sector is broadly defined, so that virtually every conceivable source of investment goods is included in industry. The one component of investment neglected by this simplifying assumption is the direct creation of capital goods in the agricultural sector. Even in this case, such industrial goods as are combined with agricultural labor to form capital would be reflected as purchases from the industrial sector and flowing through the financial nexus.

C. Treatment of Government

The productive function of the government sector is defined as the provision of collective consumption services financed by tax revenues. Hence, production of non-collective services are excluded. Where, for example, the government owns and operates industrial firms selling goods to individual firms and/or consumers, such activities would be classified as industrial sector activity.

Examples of government production, as defined, include defense, education, health, general civil administration, and similar collective services--so long as they are not sold to individual purchasers and are financed by tax and tax-like income.

All taxes are assumed to be withdrawn from income streams flowing into the income disposition nexus. It should be noted that taxes are withdrawn from income streams (P_h and P_L) before income reaches the decision making units (industrial and agricultural households) as disposable income (D_h and D_L).

D. Treatment of Non-Government Services

The industrial sector is broadly defined to include many of the services associated with the process of industrialization. This definition of industry conforms roughly with Kuznets' concept of the "extended M sector," denoted as the M^+ sector. As defined by Kuznets, the M^+ sector is "the total for mining, manufacturing, and construction plus transportation and communication."¹

¹Simon Kuznets, "Capital Formation Proportions: International Comparisons for Recent Years," Part V of "Quantitative Aspects of the Economic Growth of Nations," Economic Development and Cultural Change, Vol. VIII, No. 4, Part II, July, 1960, Page 8.

This concept of the industrial production sector still leaves the relatively large trade component unallocated. Recognizing that trade and industrial growth show some positive relationship, trade is classified as industrial activity. This leaves us with a concept of the industrial sector as essentially all non-agricultural activity--excluding only "government" in the sense of collective consumption.

III. Balance Equations and Tabular Presentation

A series of tables can be derived from the accounting framework based on balance equations, easily formulated for each junction in the diagram. An example of a system of tables thus derived is given in Appendix II.

Tables of this type are useful for estimation and presentation of the flows included in the national income accounting system. It should be noted that each table is based on a balance equation of the "sources and uses" type. Sources of income (or the appropriate concept) for each decision making unit are consistently shown on the right-hand side of the tables, while uses or disposition of income (or the appropriate concept) are shown on the left-hand side. The decision-making function, however, is not appropriate to Tables VIII and IX which show "income generation" for industry and agriculture, respectively.

Referring to the set of Tables in Appendix II, the basic balance equation behind Table I, Foreign Nexus, is:

$$(22a) \quad M = E + A$$

while it is also true that

$$(22b) \quad M_c = M_R + M_y + M_x$$

and that

$$(22c) \quad E = E_y + E_x$$

The balance equation for Table II, Industry: Production, is:

$$(23) \quad V_y + M_R + R = Y = E_y + Y_d + V_g + N$$

where $Y_d = I_d + (Y_h + Y_L - M_y)$

We note that the sources and uses sides of the table are both equal to Y, the total value of industrial output.

Similarly, in the balance equation for Table III, Agriculture: Production, the sources and uses sides both equal X, the total value of agricultural output:

$$(24) \quad V_x + N = X = E_x + X_d + X_g + R$$

where $X_d = X_h + X_L - M_x$

The balance equation for Table IV, Government: Production,
is:

$$(25) V_g + X_g + Y_g = G$$

Table V, Financial Nexus, is derived from the basic balance
equation:

$$(26a) S + A = I$$

and it is also true that:

$$(26b) S = S_h + S_L + S_g \text{ and}$$

$$(26c) I = I_d + M_i$$

The balance equation behind Table VI, Industry: Income
Disposition, is:

$$(27) Y_h + X_h + S_h = D_h$$

and for Table VII, Agriculture: Income Disposition, is:

$$(28) X_L + Y_L + S_L = D_L$$

For Tables VIII and IX, Industry, Income Generation, and
Agriculture, Income Generation, the balance equations are, respectively:

$$(29) D_h + T_h = P_h \text{ and}$$

$$(30) D_L + T_L = P_L$$

where $P_h = V_y + G_h$ and $P_L = V_x + G_L$

For Table X, Government, Income Disposition, the balance equation is:

$$(31a) G + S_g = T$$

and it is also true that:

$$(31b) T = T_h + T_L$$

The final Table in Appendix II, Table XI, is a GNP account, useful for testing the consistency of the national income account data as a whole. The right side of the table shows the standard GNP concept from the expenditure side, while the left side shows value added for the three production sectors, i. e., all income generated by the economy. Thus, the balance equation is:

$$(32) V_y + V_x + V_g = \text{GNP} = C + I + G + (E - M)$$

Actual data presented in the Tables in Appendix II are based on our preliminary estimates of these flows for the Philippines for the year 1964.¹ The data are presented to demonstrate the internal consistency of the system.

¹ Preliminary estimates for the Philippines have been completed for the years 1949 through 1953 and 1960 through 1964. The data will be analyzed in a later paper.

APPENDIX I: National Income Accounting Framework: Symbols

- G** = Government current expenditures (valuation of government services)
- X** = Output of agricultural goods
- X_g** = Agricultural goods purchased by government
- Y** = Output of industrial goods
- Y_g** = Industrial goods purchased by government
- R** = Agricultural raw materials purchased by industry
- N** = Industrial intermediate goods purchased by agriculture
- E** = Total exports (= $E_y + E_x$)
- E_x** = Exports from agricultural sector
- E_y** = Exports from industrial sector
- Y_d** = Output of industrial goods for final domestic use
- X_d** = Output of agricultural goods for final domestic use
- Y_a** = Total supply of industrial goods available for final domestic use
- X_a** = Total supply of agricultural goods available for final domestic use
- M** = Total imports (= $M_c + M_i$)
- M_c** = Imports on current account (= $M_R + M_x + M_y$)
- M_i** = Imports on capital account (capital goods)
- M_R** = Imported raw materials
- M_x** = Imported agricultural consumer goods
- M_y** = Imported (finished) industrial consumer goods

- I_d = Output of investment (capital) goods
- I = Total investment expenditures (= $I_d + M_i$)
- I_y = Investment in industrial sector
- I_x = Investment in agricultural sector
- X_L = Agricultural products purchased by agricultural households
- X_h = Agricultural products purchased by industrial households
- Y_L = Industrial products purchased by agricultural households
- Y_h = Industrial products purchased by industrial households
- V_x = Value added by agriculture
- V_y = Value added by industry
- V_g = Value added by government
- G_h = Government factor payments to industrial households
- G_L = Government factor payments to agricultural households
- P_h = Personal income of industrial households (= $G_h + V_y$)
- P_L = Personal income of agricultural households (= $G_L + V_x$)
- T_L = Taxes paid by agricultural sector
- T_h = Taxes paid by industrial sector
- T = Total government tax revenue (= $T_L + T_h$)
- D_h = Disposable income of industrial households
- D_L = Disposable income of agricultural households
- S_g = Government current surplus (i. e. , government savings)

S_L = Agricultural savings

S_h = Industrial savings

A = Foreign savings

S = Total domestic savings ($= S_h + S_L + S_g$)

$A+S$ = Total financing of investment

APPENDIX II: A System of Tables Based on National Income Accounting Framework for the Open Dualistic Economy (Philippine data: 1964, million pesos, 1955 prices)

I. Foreign Nexus

M	2488	E	2656
M _i	425	E _y	847
M _c	2063	E _x	1809
M _R	1680	A	(-168)
M _y	268		
M _x	115		
	<hr/>		<hr/>
	2488		2488

II. Industry: Production

V _y	6985	E _y	847
M _R	1680	Y _d	7203
R	2122	Y _g	112
	<hr/>	N	<hr/>
	10,787		2625
			<hr/>
			10,787

III. Agriculture: Production

V _x	4650	E _x	1809
N	2625	X _d	3104
		X _g	240
	<hr/>	R	<hr/>
	7275		2122
			<hr/>
			7275

IV. Government: Production

V_g	949	G	1301
X_g	240		
Y_g	<u>112</u>		<u> </u>
	1301		1301

V. Financial Nexus

S	2236	I	2068
S_h	1651	I_d	1643
S_L	440	M_i	425
S_g	145		
A	<u>(-168)</u>		<u> </u>
	2068		2068

VI. Industry: Income Disposition

Y_h	2935	D_h	6032
X_h	1446		
S_h	<u>1651</u>		<u> </u>
	6032		6032

VII. Agriculture: Income Disposition

X_L	1773	D_L	5106
Y_L	2893		
S_L	<u>440</u>		<u> </u>
	5106		5106

VIII. Industry: Income Generation

D_h	6032	P_h	7336
T_h	1304	V_y	6985
	<hr/>	G_h	<hr/> 351
	7336		7336

IX. Agriculture: Income Generation

D_L	5106	P_L	5248
T_L	142	V_x	4650
	<hr/>	G_L	<hr/> 598
	5248		5248

X. Government: Income Disposition

G	1301	T	1446
S_g	145	T_h	1304
	<hr/>	T_L	<hr/> 142
	1446		1446

XI. Gross National Product

V_y	6985	$C (-Y_h + Y_L + X_h + X_L)$	9047
V_x	4650	I	2068
V_g	949	G	1301
	<hr/>	$E - M$	<hr/> 168
	12,584		12,584

NATIONAL INCOME FRAMEWORK

LEVEL I

