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ECONOMIC THEORY AND SOCIAL ACCOUNTING SYSTEM

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by

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1. Introduction

Economic theory and social accounting system are closely related with each other. On the one hand, economic theory, macroeconomics in particular, has its firm basis on the social accounting system or the system of national accounts (SNA). The system of national accounts provides various accounting constraints to be satisfied by (macro) economic variables through the system of identities. The role of economic theory, then, is to introduce theoretical or hypothetical relations such as behavioral and technological equations into this set of accounting constraints and to complete a basic and probable system of interactions among economic variables for the actual economy. On the other hand, the development of social accounting system owes much to the development of economic theories. This seems obvious in the light of the history of social accounting which, having started with the estimation of "national income" by William Petty in 1665, culminated recently in the UN new SNA (United Nations [1968]).¹ In a sense, therefore, the social accounting system or the system of national accounts may better be understood by the system of economic theories.

In this paper, we will try, from the point of view of the general equilibrium theory, to clarify theoretical aspects in the existing system of national accounts and to summarize and interpret it with particular reference to the Philippines. It must be noted that by the general equi-

librium theory we simply mean a system of supply-demand equilibrium relations only, which is the basic part of that theory, but not a complete system of interdependency which also allows for behavioral equations, technological relations, and so on. The system of national accounts, literally, is an accounting system for the national economy, so that its indispensable basis is in the accounting identities such as budget constraints and definitional equations which are valid not only in the ex post sense but also in the ex ante sense. On the basis of these accounting identities, we will make clear the supply-demand equilibrium conditions (equalities) which are valid only in the ex post sense (i.e., the ex post identities) for various goods and services in the national economy, providing thus a method of interpretation on the existing system of national accounts. It may not be an exaggeration to say that the present social accounting system focuses on the national income statistics with the supplements of input-output tables, flow of funds accounts, national wealth surveys and balance of payments statistics.² Correspondingly, our discussions here will be focused mainly on the national income statistics.

In Section 2, we will provide a general equilibrium framework of the aggregate version to get a bird's-eye view of the national economy. We will introduce three kinds of equalities: supply-demand equilibrium conditions, budget constraints, and distributional equations in production (or imputational equations on physical capital). In Section 3, using the above framework, we will explain five major accounts in the

national income statistics of the Philippines, and investigate the relationships between national income and national wealth. We will also discuss about the treatment of general government whose productive activities are very difficult to be measured correctly due to the invisible non-market nature of the public services.

2. General Equilibrium Framework for the National Economy

2.1. Supply-demand equilibrium conditions and budget constraints

To get a general equilibrium framework of the aggregate version, we will break down our national economy into six components sectors: households sector (H), unincorporated enterprises (i.e., non-corporate business) sector (HB), corporate business sector (B), government enterprises sector (GE), general government sector (GG), and foreign sector (F). Generally speaking, the households sector is a pure consuming sector,³ while the corporate business sector is a pure producing sector. However, the unincorporated enterprises sector, which consists of farmers, merchants, home manufacturers, etc., engages in both producing and consuming activities so that it occupies an in-between position of the (pure) households and the corporate business sectors. Our HB-sector above is defined as the households which engage in the non-corporate business activities and, as a result, our H-sector above excludes this kind of households. The ordinary treatment in national income statistics is, of course, to regard households and unincorporated enterprises as the integrated single sector, which is called the personal sector.⁴

To simplify the analyses, let us assume without loss of generality that there exist, in our national economy, only two kinds of commodities (i.e., consumption goods and investment goods), only one kind of labor (i.e., homogeneous labor), and only one kind of financial assets. It is, of course, possible to separate financial assets into money and the others (bonds, securities, etc.), but this separation is unnecessary for the present purposes. Note that this assumption implies also the foreign commodities, labor services and financial assets to be homogeneous with the domestic ones.

Using above assumptions and sectoral break-down, we can express as in Table 1 the supply-demand relations for flow variables in the economy. The table includes also the supplementary relations on taxation, transfer payments and receipts, and stock variables, so that we can regard it as a bird's-eye view of our national economy.

In the table, tax variables are classified into three categories: direct taxes comprising personal and corporate taxes (which we call "income tax"), indirect taxes levied on assets such as real property tax (which we call "asset tax"),⁵ and the remaining indirect taxes levied mainly on commodity transactions such as excise tax, import duties, etc. (which we call "sales tax").⁶ This classification is made from the point of view of the tax incidence. Roughly speaking, the income tax will reduce to the earner of that income with little or no shifting.⁷ The same may be true also for the asset tax. However, the shifting will occur to some extent in the case of sales tax and the tax burden will be shared by both producers (suppliers) and consumers (demanders), though it is not easy to

Table 1. A Bird's-Eye View of the National Economy

SUPPLY									
E	GG	F	H	HB	B	GE	GG	F	
E	C _{GG}	C _F	C [*] _H	C [*] _{HB}	C [*] _B	C [*] _{GE}	C [*] _{GG}	C [*] _F	
	I _{GG}	I _F		I [*] _{HB}	I [*] _B	I [*] _{GE}		I [*] _F	
	L _{GG}	L _F	L [*] _H	L [*] _{HB}				L [*] _F	
	A _{GG}	A _F	A [*] _H	A [*] _{HB}	A [*] _B	A [*] _{GE}	A [*] _{GG}	A [*] _F	
S _{T_F}			TR [*] _H	TR [*] _{HB}			T [*] _{GG}	TR [*] _F	
TR _{GG}					(A _H -A [*] _H)	(A _{HB} -A [*] _{HB})	(A _B -A [*] _B)	(A _{GE} -A [*] _{GE})	(A _{GG} -A [*] _{GG})
			K _H	K _{HB}	K _B	K _{GE}	K _{GG}		
			D _H	D _{HB}	D _B	D _{GE}	D _{GG}		

sector) and private non-profit institutions sector, (private business) sector, B = corporate business sector, general government sector, and F = foreign sector.

and for C), I = investment goods (I^U = intermediate demand for I).

assets (flow) (N.B., $\dot{A} = dA/dt$, t = time),

sales tax (T_F^S = tariffs), T_{GG}^* = total tax revenue),

T_{GG}^S , total liabilities (stock),

t = time), D = quantity of depreciation,

e price.

specify the exact degree of this shifting. That is the reason why we have separated indirect taxes into two parts and introduced three major categories of income tax, asset tax and sales tax in Table 1.

From the table we can derive two types of equalities. One is the horizontal type expressed in terms of quantity and the other is the vertical type expressed in terms of value. In other words, reading the table horizontally, we get four equilibrium conditions or ex post identities for four flow variables, two identities for tax and transfer variables, and one initial condition for financial assets (stock):

(1-C) ΣC	= ΣC^*	} (equilibrium conditions or <u>ex post</u> identities)
(1-I) ΣI	= ΣI^*	
(1-L) ΣL	= ΣL^*	
(1- $\dot{A}$) $\Sigma \dot{A}$	= $\Sigma \dot{A}^*$	
(1-T) ΣT	= ΣT^*	(tax identity)
(1-TR) ΣTR	= ΣTR^*	(transfer identity)
(1-A) ΣA	= ΣA^*	(initial stock condition)

Note that gross investment in each sector of our domestic economy (I_j , $j = H, HB, B, GE, GG$), which must be realized in such a way as to satisfy the equilibrium condition (1-I) above, determines the level of physical capital stock in each sector (K_j) through the following technological (or definitional) equation:

$$(2-K) \quad \dot{K}_j = I_j - D_j \quad (j = H, HB, B, GE, GG)$$

Next, reading the table vertically, we get six budget constraints (i.e., uses of funds = sources of funds) for the six sectors of our national

economy:

$$(3-H) \quad q_C C_H + q_I I_H + p_L L_H + q_A (\dot{A}_H - \dot{A}_H^*) + (T_H^V + T_H^A) + TR_H \\ = q_C C_H^* + p_L L_H^* + p_A (A_H - A_H^*) + TR_H^* \quad (\text{See (4-H)})$$

$$(3-HB) \quad q_C C_{HB} + (q_C C_{HB}^U + q_I I_{HB}^U) + q_I I_{HB} + p_L L_{HB} + q_A (\dot{A}_{HB} - \dot{A}_{HB}^*) + (T_{HB}^V + T_{HB}^A + T_{HB}^S) + TR_{HB} \\ = q_C C_{HB}^* + q_I I_{HB}^* + p_L L_{HB}^* + p_A (A_{HB} - A_{HB}^*) + TR_{HB}^*$$

$$(3-B) \quad (q_C C_B^U + q_I I_B^U) + q_I I_B + p_L L_B + q_A (\dot{A}_B - \dot{A}_B^*) + (T_B^V + T_B^A + T_B^S) + TR_B \\ = q_C C_B^* + q_I I_B^* + p_A (A_B - A_B^*)$$

$$(3-GE) \quad (q_C C_{GE}^U + q_I I_{GE}^U) + q_I I_{GE} + p_L L_{GE} + q_A (\dot{A}_{GE} - \dot{A}_{GE}^*) \\ = q_C C_{GE}^* + q_I I_{GE}^* + p_A (A_{GE} - A_{GE}^*)$$

$$(3-GG) \quad q_C C_{GG} + q_I I_{GG} + p_L L_{GG} + q_A (\dot{A}_{GG} - \dot{A}_{GG}^*) + TR_{GG} \\ = T_{GG}^* + q_C C_{GG}^* + p_A (A_{GG} - A_{GG}^*) + TR_{GG}^* \quad (\text{See (4-GG)})$$

$$(3-F) \quad (q_C C_F + q_I I_F) + p_L L_F + q_A (\dot{A}_F - \dot{A}_F^*) + TR_F \\ = (q_C C_F^* + q_I I_F^* - T_F^S) + p_L L_F^* + p_A (A_F - A_F^*) + TR_F^*$$

it is needless to say that these budget constraints are the identities which hold not only in the ex post sense but also in the ex ante sense because, in each sector, the uses of funds must always be equal to the sources of funds. Adding up all of the above six constraints, we get:

$$(3-W) \quad q_C (\Sigma C - \Sigma C^*) + q_I (\Sigma I - \Sigma I^*) + p_L (\Sigma L - \Sigma L^*) + q_A (\Sigma \dot{A} - \Sigma \dot{A}^*) \\ = (T_{GG}^* - \Sigma T) + (\Sigma TR^* - \Sigma TR) + p_A (\Sigma A - \Sigma A^*) \\ = 0 \quad (\text{from (1-T), (1-TR) and (1-A)})$$

This is the aggregate budget constraint which leads to the Walras' Law in the general equilibrium analysis.⁹ In other words, when the above mentioned framework is regarded as (a part of) a general equilibrium model for the national economy, the four equilibrium conditions

(1-C) and (1-A) cannot be a set of independent constraints due to the fact that the aggregate budget constraint (3-W) is always valid whether the quantity variables in the model are of the ex ante concept or of the ex post concept. Therefore, if any three of the four equilibrium conditions are assumed to hold (or realized), then the remaining one will be implied (or automatically realized) by the identity (3-W). This is nothing but the situation that the Walras' Law means.

Of course, it is not always required to assume the supply-demand equilibrium conditions in the ex ante sense in model building. If no equilibrium conditions are assumed, the gaps between supply and demand will be realized as unexpected increases in inventory, unemployment and unsold financial assets respectively. In this case, it will be appropriate to introduce price adjustment equations as a substitute for equilibrium conditions.

2.2. Distribution in production (Imputation on physical capital)

In the national economy we have another kind of accounting identities which are always valid but are different in nature from the budget constraints explained above. (It is the definitional equality between value of output and value of input. It defines the distribution in production, allocating (or identifying) the produced value to (or

with) each of the production factors. Allocation to labor is not difficult since, in general, compensation of labor is directly measurable and are decomposable into price and quantity components through the market of labor services.¹⁰ Allocation to physical capital, however, is not so easy since compensation of capital is not directly measurable due to the lack of the market for capital services in almost all cases.¹¹ Therefore, the essential problem here is how to measure the compensation of capital to be decomposed into price and quantity components, i.e., the problem of imputation on physical capital.

To simplify the analysis, let us assume that capital service price (p_K) is common to every sector of our domestic economy irrespective of taxation system and managerial efficiency.¹² Then, the equality between value of (net) output and value of input (services) in each sector, i.e., the distributional equations in production, can be written as:

$$(4-H) \quad p_L^L H + p_K^K H = q_C^{C*} H \quad (\text{Definition of } q_C^{C*})$$

$$(4-HB) \quad (q_C^{C^U} + q_I^{I^U})_{HB} + p_L^L_{HB} + p_K^K_{HB} = q_C^{C*}_{HB} + q_I^{I*}_{HB} - T_{HB}^S \quad (\text{Definition of } p_K^K_{HB})$$

$$(4-B) \quad (q_C^{C^U} + q_I^{I^U})_B + p_L^L_B + p_K^K_B = q_C^{C*}_B + q_I^{I*}_B - T_B^S \quad (\text{Definition of } p_K^K_B)$$

$$(4-GE) \quad (q_C^{C^U} + q_I^{I^U})_{GE} + p_L^L_{GE} + p_K^K_{GE} = q_C^{C*}_{GE} + q_I^{I*}_{GE} \quad (\text{Definition of } p_K^K_{GE})$$

$$(4-GG) \quad p_L^L_{GG} + p_K^K_{GG} = q_C^{C*}_{GG} \quad (\text{Definition of } q_C^{C*}_{GG})$$

where K'_{GG} is the quantity of rentable structures in general government, which is only a portion of the total capital stocks existing in the GG-sector (K_{GG}). Note that (4-H) and (4-GG) above define the value of output in H- and GG-sectors respectively. In the national income statistics, $p_K K_H$ corresponds to the rental income including "imputed rent" in the H-sector, while $p_K K'_{GG}$ corresponds to the value of rental services provided by general government. These two sectors do not engage in productive activities in the usual sense, so that their products are regarded as consumption goods and are defined in terms of value added.

It is (4-HB), (4-B) and (4-GE) that are important as the imputational equations on physical capital, since the ordinary productive activities are being done in these enterprises sectors.¹³ The three identities define compensation of capital (or value of input capital services) in each of the HB, B and GE-sectors. As can be seen by comparing (4-HB) with (3-HB), (4-B) with (3-B), and (4-GE) with (3-GE), the concept of capital compensation ($p_K K$) defined here (and the resulting capital service price (p_K)) is before depreciation, before income and asset taxes and after sales tax. This is because we include in our capital services all that are considered as capital costs in production. In other words, not only depreciations but also income (business income) and asset taxes are regarded as capital costs which reduce to producers in the process of production, but the sales tax to be shared by both producers and consumers in the process of transaction is not regarded as capital costs. In this sense, capital compensation ($p_K K_H$) and value of output ($q C_H^*$) shown in (4-H) should be interpreted as the concepts before depreciation and before asset tax.

In the actual economy, we have capital of many types and the rates of return and tax burdens cannot be said to be homogeneous between sectors. It is, therefore, not so simple to estimate (impute) capital compensation or capital service price corresponding to each type of capital in each sector. However, our distributional equations in production above represent the identities of basic kind in the social accounting system and are the starting point in the actual measurement.¹⁴

3. Theoretical Summary of National Income Statistics

Using the general equilibrium framework provided in the previous section, let us summarize and interpret the existing system of national income statistics with particular reference to the Philippine national accounts.¹⁵ The standard accounting structure of the Philippines consists of five major accounts: (I) Gross National Product and Expenditures Account, (II) Personal Income and Outlay Account, (III) General Government Receipts and Expenditures Account, (IV) Combined Capital Reconciliation Account, and (V) Foreign Transactions Account. Being supplemented by eight main and twenty supporting tables, these accounts describe the aggregate flow aspect of the national economy.¹⁶ Table 2 shows the five major accounts of the Philippines with the symbolic expressions of the previous section, especially of Table 1. Except for the foreign transactions account (Account V) which corresponds to the budget constraint in the F-sector (i.e., the identity (3-F)), the expressions in Table 2 may not be self-evident from the explanations of the previous section. They will be clarified bit by bit in our discussions which follow.

Table 2. The National Income Accounts of the Philippines (CY 1973)*

I. Gross National Product and Expenditures Account

1. Compensation of employees	$p_L (L_H + L_{HB} + L_B + L_{GE} + L_{GG} + L_{FF} - L^*)$	52062
2. Entrepreneurial and property income of persons	$[p_K (K_H + K_{HB}) - q_I (D_H + D_{HB}) - (T_H^A + T_{HB}^A)] + p_A [(A_H + A_{HB}) - (A^* + A_{HB}^*)]$	
3. General government income from property and entrepreneurship	$[p_K (K_{GE} + K_{GG}) - q_I (D_{GE} + D_{GG})] + p_A [(A_{GE} + A_{GG}) - (A^* + A_{GG}^*)]$	234
4. Corporate income (a. Corporate tax, b. Corporate savings)	$(p_K K_B - q_I D_B) + p_A (A_B - A_B^*)$	3967
NATIONAL INCOME or NET NATIONAL PRODUCT at factor cost	$p_L (L^* + L_{HB}^*) + (p_K K - q_I D - T^A) + p_A (A^* - A_F)$	56263
5. Indirect taxes less subsidies	$(T_H^A + T_{HB}^A) + (T_B^S + T_{HB}^S) + (T_F^S + T_{HB}^S)$	6179
6. Capital consumption allowance	$q_I (D_H + D_{HB} + D_B + D_{GG})$	7583
GROSS NATIONAL PRODUCT at market prices		70025
7. Personal consumption expenditures	$q_C (C_H + C_{HB})$	48699
8. General government consumption expenditures	$q_C C_{GG}$	5989
9. Gross domestic capital formation (a. Fixed capital formation, b. Increase in stocks)	$q_I (I_H + I_{HB} + I_B + I_{GG})$	14470
10. Exports of goods and services	$q_C C_F + q_I I_F$	15623
11. Less: Imports of goods and services	$q_C C_F^* + q_I I_F^* - T_F^S$	-13716
EXPENDITURES ON GROSS DOMESTIC PRODUCT		71065
12. Net factor income from abroad	$p_L (L_F - L_F^*) + p_A (A_F^* - A_F)$	- 450
13. Statistical discrepancy	***	- 590
EXPENDITURES ON GROSS NATIONAL PRODUCT		70025

*** vanishes under exact measurement.

1. Personal consumption expenditures	$q_C(C_H + C_{HB})$	48699
2. Personal direct taxes	$(T_H^V + T_{HB}^V)$	1649
3. Personal savings	$S_H + S_{HB}$	4679
4. Statistical discrepancy	***	- 590

DISPOSAL OF INCOME

5. Compensation of employess	$P_L(L_H^* + L_{HB}^*)$	54437
6. Entrepreneurial and property income of persons	$[P_K(K_H + K_{HB}) - q_I(D_H + D_{HB}) - (T_H^A + T_{HB}^A)] + P_A[(A_H + A_{HB}) - (A_H^* + A_{HB}^*)]$	52062
7. Current transfer payments (a. From general government, b. From abroad)	$(TR_H^* + TR_{HB}^*) - (TR_H + TR_{HB})$	2375

PERSONAL INCOME

PERSONAL INCOME		54437
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*** vanishes under exact measurement.

III. General Government Receipts and Expenditures Account

1. General government consumption expenditures	$q_C C_{GG}$	5989
2. Current transfer payments to persons	TR_{GG}	1214
3. General government savings (dissavings)	$S_{GE} + S_{GG}$	2953
CURRENT EXPENDITURES		10156
4. General government income from property and entrepreneurship	$[P_K(K_{GE} + K'_{GG}) - q_I(D_{GE} + D_{GG})] + P_A[(A_{GE} + A_{GG}) - (A_{GE}^* + A_{GG}^*)]$	234
5. Indirect taxes less subsidies	$(T_H^A + T_{HB}^A) + (T_{HB}^S + T_{BF}^S)$	6179
6. Direct taxes (a. On corporations, b. On persons)	$T_B^V + (T_H^V + T_{HB}^V)$	3323
7. Current transfer payments from abroad	TR_{GG}^*	420

CURRENT RECEIPTS

CURRENT RECEIPTS		10156
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IV. Combined Capital Reconciliation Account

1. Gross domestic capital formation		
(a. Fixed capital formation, b. Increase in stocks)	$q_I(I_H + I_{HB} + I_B + I_{GG})$	14470
GROSS DOMESTIC CAPITAL FORMATION		14470
2. Personal savings	$S_H + S_{HB}$	4679
3. Corporate savings	S_B	2293
4. General government savings (dissavings)	$S_{GE} + S_{GG}$	2953
5. Capital consumption allowance	$q_I(D_H + D_{HB} + D_B + D_{GG})$	7583
6. Net borrowing (lending) from abroad	$q_A(A_F - A_F^*)$	-3038
GROSS SAVINGS		14470

V. Foreign Transactions Account

1. Exports of goods and services (a. Merchandise, FOB,		
b. Freight and insurance, c. Other exports)	$q_C C_F + q_I I_F$	15623
2. Net factor income from abroad	$P_L(L_F - L_F^*) + P_A(A_F^* - A_F)$	- 450
3. Current transfer payments from abroad		
(a. To persons, b. To general government)	$TR_F - TR_F^*$	1581
4. Net borrowing (lending) from abroad	$A_F - A_F^*$	- 3038
CURRENT RECEIPTS		13716
5. Imports of goods and services (a. Merchandise, FOB,		
b. Freight and insurance, c. Other imports)	$q_C C_F + q_I I_F^* - T^S$	13716
CURRENT PAYMENTS		13716

*Notation: the same as in Table 1 except for S_j ($j = H, HB, B, GE, GG$) which means net savings in sector j.

Source: NEDA National Income Series, Number 3, pp. 18-23 (at current prices in million pesos).

3.1. Three approaches to the estimation of GNP

It is needless to say that we have three methods of estimating gross national product (GNP): expenditure approach, value of output approach, and factor income approach. The three approaches give, if the informations are fully available, the same and identical results on the estimates of GNP since there must hold the following equality relationship in the aggregate national economy: value of expenditures = value of output (in terms of value added) = factor income. Let us consider this equality relationship in a rigorous way on the basis of our theoretical framework in the previous section.

As can be seen from Account I of Table 2, GNP is defined usually from the expenditure side as:¹⁷

$$(5-e) \quad GNP = q_C(C_H + C_{HB} + C_{GG}) + q_I(I_H + I_{HB} + I_B + I_{GE} + I_{GG}) \\ + (q_C C_F + q_I I_F + p_L L_F + p_A A_F^*) - (q_C C_F^* + q_I I_F^* - T_F^S + p_L L_F^* + p_A A_F)$$

[GNP defined from expenditures].

Note that, in the last term above which represents "imports and factor income paid abroad," tariffs or import duties (T_F^S) must be deleted to get the value of imports evaluated at the prices of foreign transactions, since $(q_C C_F^* + q_I I_F^*)$ indicates the value of imports evaluated at the prices of domestic transactions under our theoretical framework. The GNP defined thus from the expenditure (demand) side can be transformed into the GNP defined from the production (supply) side by using two equilibrium conditions (i.e., the ex post identities, (1-C) and (1-I)) in the commodity market:

$$(5-p) \quad GNP = q_C C_H^* + (q_C C_{HB}^* + q_I I_{HB}^* - q_C C_{HB}^U - q_I I_{HB}^U) + (q_C C_B^* + q_I I_B^* - q_C C_B^U - q_I I_B^U) \\ + (q_C C_{GE}^* + q_I I_{GE}^* - q_C C_{GE}^U - q_I I_{GE}^U) + q_C C_{GG}^* + [p_L (L_F - L_F^*) + p_A (A_F^* - A_F)] \\ + T_F^S$$

[GNP defined from output (value added)]

This corresponds to "GNP at market prices" of Account I, but the correspondence is not direct since in the actual estimation of GNP at market prices the factor income approach is usually used in combination with the value of output approach,¹⁸ so that the production side of Account I is expressed in terms of factor income. The first four Main Tables which provide estimates on "gross national product, national income and net domestic product by industrial origin" may be considered as giving a more direct correspondence to the above definition.

Note that GNP (gross "national" product) indicates total value produced by the residents in the Philippines while GDP (gross "domestic" product) indicates total value produced within the territory of the Philippines. Therefore, the difference between GNP and GDP is equal to the difference between the value produced (or added) by the Philippine residents outside of the Philippine territory (i.e., $p_L L_F^* + p_A A_F^*$) and the value produced (or added) by the non-residents within the Philippine territory (i.e., $p_L L_F^U + p_A A_F^U$). In other words, the difference between GNP and GDP is equal to the net factor income from abroad (i.e., $p_L (L_F - L_F^*) + p_A (A_F^* - A_F)$), so that we obtain

$$(5-p)' \quad GDP = q_C C_{HB}^* + (q_C C_{HB}^* + q_I I_{HB}^* - q_C C_{HB}^U - q_I I_{HB}^U) + (q_C C_B^* + q_I I_B^* - q_C C_B^U - q_I I_B^U) \\ + (q_C C_{GE}^* + q_I I_{GE}^* - q_C C_{GE}^U - q_I I_{GE}^U) + q_C C_{GG}^* + T_F^S.$$

The term T_F^S (tariffs or import duties), which appears above as well as in (5-p), can be interpreted as the value of invisible government services which must be added to the imported commodities in the process of their domestic transactions. The same government services for the domestically produced goods (i.e., $T_{HB}^S + T_B^S$) are already allowed for implicitly in the definition of output of the private enterprises sector (i.e., the second and the third terms above). From the point of view of the production function which describes the technological relationship between output, labor and physical capital, GDP is more appropriate than GNP as the concept of output. GNP is closer to the concept of income.

To get GNP derived from factor income side, let us define income in each of our domestic sectors (or course, income of the Philippine residents) as:

$$\begin{aligned}
 (5-V) \quad \left\{ \begin{aligned}
 V_H &= P_L L_H^* + (q_C C_H^* - p_L L_H) + p_A (A_H - A_H^*) - (T_H^V + T_H^A) \\
 V_{HB} &= P_L L_{HB}^* + (q_C C_{HB}^* + q_I I_{HB}^* - q_C C_{HB}^U - q_I I_{HB}^U - p_L L_{HB}) \\
 &\quad + p_A (A_{HB} - A_{HB}^*) - (T_{HB}^V + T_{HB}^A + T_{HB}^S) \\
 V_B &= (q_C C_B^* + q_I I_B^* - q_C C_B^U - q_I I_B^U - p_L L_B) + p_A (A_B - A_B^*) - (T_B^V + T_B^A + T_B^S) \\
 V_{GE} &= (q_C C_{GE}^* + q_I I_{GE}^* - q_C C_{GE}^U - q_I I_{GE}^U - p_L L_{GE}) + p_A (A_{GE} - A_{GE}^*) \\
 V_{GG} &= T_{GG}^* + (q_C C_{GG}^* - p_L L_{GG}) + p_A (A_{GG} - A_{GG}^*)
 \end{aligned} \right.
 \end{aligned}$$

Using the imputational equations (4-H)~(4-GG), we can rewrite the above definition of sectoral income as:

$$V_H = p_{LH}^* + p_{KH} + p_A(A_H - A_H^*) - (T_H^V + T_H^A)$$

$$V_{HB} = p_{LHB}^* + p_{KHB} + p_A(A_{HB} - A_{HB}^*) - (T_{HB}^V + T_{HB}^A)$$

$$(5-V) \quad V_B = p_{KB} + p_A(A_B - A_B^*) - (T_B^V + T_B^A)$$

$$V_{GE} = p_{KGE} + p_A(A_{GE} - A_{GE}^*)$$

$$V_{GG} = T_{GG}^* + p_{KGG} + p_A(A_{GG} - A_{GG}^*)$$

Note that this sectoral income is gross since it includes depreciation in each sector. It is the income after taxes (except V_{GG}) and $(V_H + V_{HB})$ corresponds to the receipt side of Account II (personal account) while

$(V_{GE} + V_{GG})$ corresponds to the receipts side of Account III (government account).¹⁹ Combining (5-V) with (5-p) and using equilibrium condition

in the factor market (1-L) and supplementary identities (1-T)~(1-A),

we get

$$(5-i) \quad GNP = \sum_j V_j \quad (j = H, HB, B, GE, GG)$$

[GNP defined from income distribution]

which completes the equality relationship in the aggregate national economy. In other words, we can estimate GNP equivalently from factor income side by adding up gross income in each sector estimated by (5-V) through the domestic sectors. Furthermore, using the sectoral income defined as in (5-V)', we can understand that (5-i) corresponds to GNP at market prices in Account I.

3.2. National savings and national wealth

We can derive the aggregate relationship between national savings and domestic investment also from the sectoral income shown in (5-V).

Let us first define net saving in each sector as:

$$(6-S) \quad \left\{ \begin{array}{l} S_H = (V_H + (TR_H^* - TR_H) - q_{I_H} D_H) - q_{C_H} C_H \\ S_{HB} = (V_{HB} + (TR_{HB}^* - TR_{HB}) - q_{I_{HB}} D_{HB}) - q_{C_{HB}} C_{HB} \\ S_B = (V_B + (-TR_B) - q_{I_B} D_B) \\ S_{GE} = (V_{GE} - q_{I_{GE}} D_{GE}) \\ S_{GG} = (V_{GG} + (TR_{GG}^* - TR_{GG}) - q_{I_{GG}} D_{GG}) - q_{C_{GG}} C_{GG} \end{array} \right.$$

Then, using the budget constraints (3-H) and (3-GG), we get

$$q_{I_j} I_j + q_A \dot{A}_j = (q_{I_j} D_j + S_j) + q_A \dot{A}_j^* \quad (j = H, HB, B, GE, GG).$$

This is, of course, another way of expressing budget constraint which

describes the equality between uses of funds and sources of funds in

each of the domestic sectors. Next, summing these identities up to the

national level, we get²⁰

$$(6-W) \quad \Sigma q_{I_j} I_j + \Sigma q_A \dot{A}_j = \Sigma q_{I_j} D_j + \Sigma S_j + \Sigma q_A \dot{A}_j^* \quad (j = H, HB, B, GE, GG)$$

which, by allowing for the ex post identity (1-A), leads to

$$q_{I_j} \Sigma I_j + q_A (\dot{A}_F^* - \dot{A}_F) = q_{I_j} \Sigma D_j + \Sigma S_j \quad (j = H, HB, B, GE, GG).$$

This indicates the ex post equality between sum of gross domestic

investment and net lending abroad and gross national savings (GNS),²¹

and corresponds to Account IV which is the combined capital reconciliation account.²²

(7-2) The combined capital reconciliation account is often called capital accumulation account since it shows the linkage of flow variables to the stocks, especially to national wealth. As in the case of national savings, national wealth can also be derived by aggregating net worth or wealth existing in each of our domestic sectors. Let us first define net worth or wealth of each sector as

$$W_j = q_I K_j + q_A A_j - q_A A_j^* \quad (j = H, HB, B, GE, GG).$$

Then, net worth of the national economy (i.e., national wealth) becomes:

$$\begin{aligned} (7-W) \quad W &= W_H + W_{HB} + (W_B + W_{GE} + W_{GG}) \\ &= \sum q_I K_j + \sum q_A A_j - \sum q_A A_j^* \quad (j = H, HB, B, GE, GG) \\ &= q_I (K_H + K_{HB} + K_B + K_{GE} + K_{GG}) + q_A (A^* - A_F) \quad (\text{from (1-A)}) \end{aligned}$$

In other words, national wealth may be defined as the sum of total value of tangible assets existing in the domestic economy and net claims on the rest of the world. Annual change in the national wealth thus defined can be derived by using (2-K) as

$$\begin{aligned} \dot{W} &= \{q_I \Sigma I_j + q_A (\dot{A}_F^* - \dot{A}_F)\} + q_A \Sigma D_j + \{q_I \Sigma K_j + q_A (\dot{A}_F^* - \dot{A}_F)\} \\ &= \Sigma S_j + \{q_I \Sigma K_j + q_A (\dot{A}_F^* - \dot{A}_F)\} \quad (j = H, HB, B, GE, GG). \end{aligned}$$

In words, annual change in national wealth is equal to the sum of net savings in the national economy (the savings side of Account IV²³) and

capital gains, so that we can understand net national savings is the major factor which causes increase in national wealth.

3.3. National income and national wealth

It seems obvious that total income of a household consists of wage income (labor income) accruing from its labor force and property income accruing from its tangible and intangible (financial) assets, provided that the imputed rent and imputed wage are allowed for if necessary. The same is true also for the aggregate national economy. In other words, using (5-V)' which defines sectoral income in terms of imputational equations (4-H)~(4-GG), we can transform GNP defined from income distribution (5-i) into

$$(8-i) \quad \text{GNP} = p_L(L_H^* + L_{HB}^*) + p_K(K_H + K_{HB} + K_B + K_{GE} + K'_{GG}) + p_A(A^* - A_F) + (T_{HB}^S + T_B^S + T_F^S),$$

which means that GNP as the income concept (except for sales tax) comprises income from labor provided by the people and income from wealth owned by the people. On the other hand, the similar expression for GDP is

$$(8-p) \quad \text{GDP} = p_L(L_H + L_{HB} + L_B + L_{GE} + L_{GG}) + p_K(K_H + K_{HB} + K_B + K_{GE} + K'_{GG}) + (T_{HB}^S + T_B^S + T_F^S),$$

so that GDP as the output concept (except for sales tax) can be decomposed into compensation of labor and compensation of capital. Sales tax $(T_{HB}^S + T_B^S + T_F^S)$ may be considered as part of government services which contributes independently to national income and domestic product, since

income tax $(T_H^V + T_{HB}^V + T_B^V)$ and asset tax $(T_H^A + T_{HB}^A + T_B^A)$, when regarded as the

other government services, are included implicitly in labor and property income (or compensation), i.e., in p_L , p_K and p_A .

Note here that the aggregate wealth which appears in (8-i) is slightly different from the national wealth, so that national income (GNP as the income concept) does not equal the sum of income from labor and income from national wealth.²⁴ In this sense, there exists some inconsistency between national income statistics and the concept of national wealth. This is related to the treatment of general government sector or the evaluation of invisible government services in the existing system of national accounts.

We can avoid the conceptual inconsistency between national income and national wealth by treating general government as a producing sector of the ordinary type as in Kuznets [1941, pp. 31-34]. In this case, on the one hand, general government is assumed to produce invisible services (T_{GG}^*) as well as rental services ($p_K K_{GG}'$) using labor (L_{GG}) and capital (K_{GG}) as primary inputs and consumption goods ($C_{GG} - p_L L_{GG}/q_C$) as intermediate inputs. On the other hand, it is also assumed that households sector purchases (pays tax for) those invisible services for final use while enterprises sector purchases (pays tax for) those services for intermediate use. Then, GNP defined from expenditure side in (5-e) must be modified slightly in accordance with the above change in assumptions:

$$\overline{GNP} = GNP - q_C C_{GG} + (T_H^V + T_H^A) + (T_B^V + T_B^A)$$

where T_H^V and T_H^A represent the income and asset taxes to be levied on the households in our HB-sector (so that T_B^V and T_B^A represent the

same taxes to be levied on the business enterprises in our HB-sector). Furthermore, the imputational equations (4-H)~(4-GG) also must be modified by the same reason:

$$p_L^H + \bar{p}_K^H = q_C^H$$

$$(q_C^{UH} + q_I^{UH}) + p_L^H + \bar{p}_K^H + (T_B^V + T_B^A + T_B^S) = q_C^{UH} + q_I^{UH}$$

$$(q_C^{UB} + q_I^{UB}) + p_L^B + \bar{p}_K^B + (T_B^V + T_B^A + T_B^S) = q_C^{UB} + q_I^{UB}$$

$$(q_C^{UG} + q_I^{UG}) + p_L^G + \bar{p}_K^G = q_C^{UG} + q_I^{UG}$$

$$q_C(C - p_L^{GG}/q_C) + p_L^{GG} + \bar{p}_K^{GG} = T^{GG} + \bar{p}_K^{GG}$$

where $\bar{p}_K$ is the service price of capital after all kinds of taxes which is assumed again to be common to every sector. Then, using the modified imputational equations above, we can write the modified GNP and its GDP counterpart as

$$\overline{GNP} = p_L(L_H^* + L_{HB}^* + L_B^* + L_{GE}^* + L_{GG}^*) + \bar{p}_K(K_H + K_{HB} + K_B + K_{GE} + K_{GG}) + p(A^* - A)$$

$$\overline{GDP} = p_L(L_H + L_{HB} + L_B + L_{GE} + L_{GG}) + \bar{p}_K(K_H + K_{HB} + K_B + K_{GE} + K_{GG})$$

for which we can see the consistency between national income and national wealth is guaranteed. This way of treating general government, however, is abandoned by Kuznets himself.²⁵

4. Concluding Remarks

We have shown in this paper that the Walras' Law holds in the existing system of national accounts, especially in the existing national

income statistics. That means that the national income statistics itself can be interpreted in terms of general equilibrium framework. National income statistics provides a statistical description of the national economy, while general equilibrium theory is a method of analysis of the actual economy, so that our outcome above is nothing but the reconfirmation of a well-established fact. Still, our result seems not to be fully recognized in general. It is important especially in macroeconomic model building which must deal with national income data from the viewpoint of some relevant theory. In our theoretical interpretation of national income statistics with particular reference to that of the Philippines, we have attempted to make a special distinction between supply-demand equilibrium conditions (ex post identities), budget constraints (identities between uses and sources of funds) and distributional equations in production (definitional identities). This is because the three different types of equalities are used in mixed and entangled way in the (five) basic accounts of the existing (Philippine) national income statistics.

In this paper, we have also shown that there exists some conceptual inconsistency between national income statistics and national wealth due to the difficulties in treating general government properly and consistently. To treat general government as a producer providing public services in exchange for tax payments, which was proposed by Kuznets and abandoned by himself later, has an important merit in the sense that the consistency is guaranteed between national income and national

wealth. However, it will not be a very persuasive principle to evaluate public services by tax payments in the light of the actual economic conditions such as progressive taxation, composition of government expenditures and so on. The present consensus on this problem seems to be in the UN new SNA (United Nations [1968]), which proposes to evaluate public service production in terms of government expenditures classified by type of objective, making thus clear the role of general government as the producer of public services, while neglecting still the inconsistency between national income and national wealth. 26,27

2. In the case of public services, we have to consider the fact that some productive activities in the economy are financed by capital services supplied by the government (e.g., highways, bridges, etc.) and others by private capital (e.g., houses, cars, etc.). This distinction is important for the evaluation of public services, which will be dealt with in the next section.

2.1. The first problem is the evaluation of public services. In the case of public services, we have to consider the fact that some productive activities in the economy are financed by capital services supplied by the government (e.g., highways, bridges, etc.) and others by private capital (e.g., houses, cars, etc.). This distinction is important for the evaluation of public services, which will be dealt with in the next section.

2.2. The second problem is the evaluation of public services. In the case of public services, we have to consider the fact that some productive activities in the economy are financed by capital services supplied by the government (e.g., highways, bridges, etc.) and others by private capital (e.g., houses, cars, etc.). This distinction is important for the evaluation of public services, which will be dealt with in the next section.

2.3. The third problem is the evaluation of public services. In the case of public services, we have to consider the fact that some productive activities in the economy are financed by capital services supplied by the government (e.g., highways, bridges, etc.) and others by private capital (e.g., houses, cars, etc.). This distinction is important for the evaluation of public services, which will be dealt with in the next section.

2.4. The fourth problem is the evaluation of public services. In the case of public services, we have to consider the fact that some productive activities in the economy are financed by capital services supplied by the government (e.g., highways, bridges, etc.) and others by private capital (e.g., houses, cars, etc.). This distinction is important for the evaluation of public services, which will be dealt with in the next section.

FOOTNOTES

- * Research associate at the Kyoto University Center for Southeast Asian Studies and visiting associate professor at the University of the Philippines School of Economics. This paper is based on Chapter One of the author's forthcoming book (in Japanese), Econometric Analyses of the Japanese Economy -- An Approach from the System of National Accounts. The author expresses his appreciation to Professor Harry T. Oshima for his kind instructions on research materials related to the Philippine national accounts.
1. See Studenski [1961] which gives a detailed and comprehensive study of the historical development of social accounting system. See also a brief survey by Kendrick [1972, Ch. 2] which covers also the recent achievements in social accounting system. See United Nations [1964] for the UN old SNA.
 2. Flow of funds accounts and national wealth surveys are not available yet in the case of the Philippines.
 3. Strictly speaking, we must allow for some productive activities in the households sector such as capital services accruing from residential structures including owner-occupied ones (i.e., including imputed rent) and labor services provided by others (like maids, drivers, gardeners, etc.), which will be dealt with in the next subsection.
 4. See Account II in Table 2.
 5. Note that "real property tax" is classified as a direct tax in the primary data source (for example, NEDA Statistical Yearbook 1975, pp. 356-357), while it is regarded as an indirect tax in the actual practices of national income statistics (The 1971 Manual: National Economic Council [1970], Part A, p. 19).
 6. Strictly speaking, we should separate out the fourth tax category, i.e., "transfer tax" such as gift and inheritance taxes.
 7. For the corporate income tax, the extent of shifting may not be negligible but seems to be smaller than in the case of sales tax. At least, the income tax is different in nature from the sales tax even in the light of the tax incidence. For the tax incidence in the Philippines, see a detailed study made by Edita Tan [1975].
 8. Note that domestic capital formation in national income statistics is limited in scope to the currently produced capital goods or the

imported ones, because the domestic transactions of the already existing capital assets such as used machines, land, etc. will be cancelled out within or between the transacting sectors. Our budget constraints (3-H) to (3-GG) are written based on a similar principle so that they are not precise. To be more precise, we must introduce explicitly the stock value of investment goods instead of the flow value into those budget constraints.

9. As to the Walras' Law, compare our result with the theoretical framework and derivation in Patinkin [1966] or Modigliani [1963]. Both separate financial assets into money and the other assets but employ the concept of homogeneous output making no distinction between consumption and investment goods. See also Bent Hansen [1970, Ch. 7] for the stock and the flow equilibriums.

10. Labor services provided by self-employed and unpaid family workers in the unincorporated enterprises sector are the exceptions. Their compensation must be imputed.

11. House for rent, rental computer, rent-a-car, tenant land, etc. are the examples of the capital services which are transacted directly in the market. However, it must be noted that rent minus current costs (of labor and intermediate inputs) corresponds to the capital services.

12. Note that, if tax parameters are neglected, the competitive service price of capital can be expressed as:

$$p_K = -(r + \mu - q_I/q_I) \cdot q_I$$

where r is rate of return (or interest) and μ is rate of depreciation.

13. It is more appropriate to interpret (4-HB) as the definition of $(p_{L_{HB}} + p_{K_{HB}})$ since the labor compensation of the HB-sector must be imputed (footnote 10) by some proper methods (for example, by using average wage rate in other sectors or by the living costs of families). Note that our HB-sector engages also in the same type of activities as our H-sector, so that (4-HB) should be interpreted as containing implicitly the counterpart of (4-H).

14. Christensen and Jorgenson [1969] is an example of the actual measurement for the U.S. economy. See Ezaki and Jorgenson [1973] for the Japanese case.

15. For the Philippine national accounts, see NEDA National Income Series, Number 1 to Number 3. For their sources and methods of estimation,

see the 1971 Manual (National Economic Council [1970]), technical notes in The Statistical Reporter (April-June 1971, April-June 1972), and explanatory notes in National Income Series. For the discussions on the basic problems in Philippine national income statistics, see National Economic Council [1971a, 1971b].

16. See NEDA National Income Series, Number 3 (1975). The main tables provide estimates on "gross national product, national income and net domestic product by industrial origin" and on "gross national product by expenditure shares," while the supporting tables provide various supporting data mainly of sectoral details.
17. It may be better to start with the definition from the production side (i.e., (5-p)), since GNP literally means gross product of the nation.
18. Therefore, the statistical discrepancy emerges only once showing the discrepancy between GNP estimate of the expenditure approach and that of the combined approach. See the 1971 Manual (National Economic Council [1970]) and the memorandum by R.C. Turner (National Economic Council [1971a, Ch. 12]).
19. There is no account in the existing national income statistics which corresponds to V_B (i.e., no corporate account).
20. Note that the aggregate identity (6-W)' is not the one which leads to Walras' Law in our general equilibrium framework of the previous section. This is because the budget constraint of foreign sector (3-F) is not used in aggregation. Writing, as in (5-V), "income" of the F-sector like

$$V_F = (q_C C_F^* + q_I I_F^* - T_F^S) - (q_C C_F + q_I I_F) + p_L (L_F^* - L_F) + p_A (A_F - A_F^*),$$

we can define foreign saving or foreign surplus as

$$S_F = V_F + (TR_F^* - TR_F)$$

so that another expression for budget constraint (3-F) becomes:

$$S_F = q_A (A_F - A_F^*) \quad \text{or} \quad q_A \dot{A}_F = S_F + q_A \dot{A}_F^*$$

By adding the latter above to the identity (6-W)', we get the aggregate budget constraint which is equivalent with (3-W):

$$(6-W) \quad q_I \sum I_j - (\sum (q_I D_j + S_j) + S_F) = q_A (\sum \dot{A}_j^* - \sum \dot{A}_j)$$

(where $j = H, HB, B, GE, GG$ and $j' = H, HB, B, GE, GG, F$).

This identity indicates that excess investment, i.e., investment demand which exceeds supply of savings including that of the foreign sector, is always (both in the ex ante and in the ex post sense) equal to excess supply of financial assets. That means that the equality between investment and savings (including foreign one) implies the equality between supply and demand on financial assets and vice versa, so that the two equality (or equilibrium) conditions cannot be independent with each other (under our simplified framework of the previous section).

21. GNS, which is defined by the right hand side above, may also be written as follows using (6-3), (5-1) and (1-TR):

$$\text{GNS} = \text{GNP} + (\text{TR}_F - \text{TR}_G) - q(\text{CH} + \text{C}_{\text{HB}} + \text{C}_{\text{GC}})$$

22. Note that, in Account IV, net lending abroad appears in the savings side with opposite sign under the name of net borrowing from abroad. This means that net borrowing abroad or foreign surplus (footnote 20) is regarded as a source of funds for domestic capital formation. However, it seems better to write it in the capital formation side in order to show explicitly the uses of GNS which is closely related to the change in national wealth (See footnote 23).

23. Change in national wealth corresponds to national savings while its composition corresponds to capital formation both in domestic and in foreign sectors. In this sense, net lending abroad should appear in the capital formation side of Account IV.

24. The discrepancy is due to the two sources: the sales tax ($T_{\text{HB}}^S + T_B^S + T_F^S$) and the capital services accruing from the stock of non-rentable structures and durables in the general government sector ($p_K(K_{\text{GC}} - K'_{\text{GC}})$), of which the latter is crucial. The discrepancy due to the former can be removed by the change in our theoretical framework, i.e., by employing the commodity evaluation at producers' prices instead of at purchasers' prices (in the sense of the input-output table) while treating the sales tax as capital cost to be included in p_K . The discrepancy due to the latter is conceptual and can be removed either by the change in the treatment of general government, which will be discussed below, or by some imputational procedure to estimate capital compensation for the government non-rentable stocks, which is opportunistic because we have no objective standard to be used for imputation unlike the case of owner-occupied dwellings for which we have market rent.

25. There occurred a controversy on the treatment of general government and evaluation of government services in the 1930's. This controversy is surveyed in detail by Shigeto Tsuru [1951, Ch. 3]

26. According to the new SNA (Standard Account II-D), government service production is defined as the sum of current inputs only:

Production of government services
= intermediate consumption (non-durable goods)
+ labor compensation + depreciation + indirect taxes

so that this definition of output neglects capital service input accruing from the stocks of durable goods purchased by general government. As a result, the inconsistency between national income and national wealth still remains unsolved. In the new SNA, the government service production above is defined for each type of government expenditures such as general government services, national defense, education, health, social security and welfare, housing and regional social services, economic services, etc., and is assumed to be consumed by general government itself.

27. Edita Tan [1975] provides an interesting analysis of the government spending in the Philippines from the point of view of the income distribution. Her treatment of government expenditures is along the same line with that of the new SNA. However, unlike the new SNA where government is treated as both producer and consumer of its services, she attempts to make definite the specific receivers of the government services by allocating various expenditures to each income class.

The following table shows the results of the analysis of variance for the different groups of subjects. The results are presented in the form of a table. The first column shows the group of subjects, the second column shows the mean score, the third column shows the standard deviation, and the fourth column shows the t-value. The results are as follows:

Group	Mean	SD	t-value
Group 1	10.5	2.5	1.2
Group 2	12.0	3.0	1.5
Group 3	11.0	2.8	1.3
Group 4	13.0	3.2	1.6
Group 5	10.0	2.2	1.1
Group 6	12.5	3.1	1.4
Group 7	11.5	2.9	1.3
Group 8	13.5	3.3	1.7
Group 9	10.5	2.5	1.2
Group 10	12.0	3.0	1.5

The results of the analysis of variance are presented in the form of a table. The first column shows the group of subjects, the second column shows the mean score, the third column shows the standard deviation, and the fourth column shows the t-value. The results are as follows:

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Group 6	12.5	3.1	1.4
Group 7	11.5	2.9	1.3
Group 8	13.5	3.3	1.7
Group 9	10.5	2.5	1.2
Group 10	12.0	3.0	1.5

15. There occurred a considerable increase in the number of general government employees in the 1930's. This country's and evaluation of government service in the 1930's. This country's is answered in detail by Robert Tamm (1961, p. 3).

REFERENCES

- L.R. Christensen and D. W. Jorgenson, "The Measurement of U.S. Real Capital Input, 1929-1967," Review of Income and Wealth, Series 16, December 1969, pp. 293-320.
- M. Ezaki, Nihon Keizai no Modelu Bunseki -- Kokumin Keizai Keisan Karano Sekkin (Econometric Analyses of the Japanese Economy -- An Approach from the System of National Accounts), forthcoming from Sobun-sha.
- M. Ezaki and D. W. Jorgenson, "Measurement of Macroeconomic Performance in Japan, 1951-1968," in K. Ohkawa and Y. Hayami (eds.), Economic Growth: the Japanese Experience since the Meiji Era, Vol. 1, Tokyo, Japan Economic Research Center, 1973, pp. 286-361.
- B. Hansen, A Survey of General Equilibrium Systems, New York, McGraw-Hill, 1970.
- J. W. Kendrick, Economic Accounts and Their Uses, New York, McGraw-Hill, 1972.
- S. Kuznets, National Income and Its Composition, 1919-1938, National Bureau of Economic Research, 1941.
- F. Modigliani, "The Monetary Mechanism and Its Interaction with Real Phenomena," Review of Economics and Statistics, Vol. XLV, Part 2, February 1963, pp. S79-S107.
- National Economic and Development Authority, NEDA National Income Series, Number 1 to Number 3, Manila, 1973 to 1975.
- _____, NEDA Statistical Yearbook of the Philippines 1975, Manila, 1975.
- National Economic Council, Sources and Methods of Estimation for the National Accounts of the Philippines and Supporting Tables, mimeograph, 1970.
- _____, Selected Papers on National Income Methodology, mimeograph, Manila, September 1971a.
- _____, "Workshop on Philippine National Income Accounts Methodology," The Statistical Reporter, Vol. XV, No. 4, October-December 1971b, pp. 12-23.

D. Patinkin, Money, Interest and Prices, Second Edition, New York, Harper and Row, 1966.

P. Studenski, The Income of Nations (Part One: History), New York, New York University Press, 1961.

E. A. Tan, "Taxation, Government Spending and Income Distribution in the Philippines," in JERC and CAMS, Income Distribution, Employment and Economic Development in Southeast and East Asia, The Japan Economic Research Center (Tokyo) and The Council for Asian Manpower Studies (Manila), July 1975, pp. 232-280.

S. Tsuru, Kokumin Shotoku to Saiseisan (National Income and Reproduction). Tokyo, Yuh-i-kaku, 1951.

United Nations, A System of National Accounts and Supporting Tables, Studies in Methods, Series F, No. 2, Rev. 2, New York, 1964.

_____, A System of National Accounts, Studies in Methods, Series F, No. 2, Rev. 3, New York, 1968.

