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Growth Accounting of the Philippines: The Demand-for-Output Side

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I Introduction

The first and main account in national income statistics (NIS) is the gross national product and expenditure account which gives GNP estimates from both factor income and expenditures. It is a framework for the national economy to account for *level* of output (i.e., value added) from both sides of inputs (i.e., factor income) and demands (i.e., expenditures). This means that *growth* of output(s) also can be accounted for from both sides: growth of inputs and growth of demands. In other words, there can be, for the national economy, an accounting framework in terms of growth rates which may be called growth accounting (in the broad sense).

The growth accounting *from the input side* based on national income statistics (i.e., NIS basis) is well-established in relation to the concept of production function and identical with the measurement of total factor productivity. In the previous paper (Ezaki [1976]), the author has presented a framework for growth accounting from the input side based on the input-output (IO) tables (i.e., IO basis) and provided a measurement on the Philippine economy comparing the 1965 and 1969 input-output tables (i.e., measurement of the IO basis) as well as using the NIS data (i.e., measurement of the NIS basis). In this paper, we will discuss the growth accounting *from the demand side* under the IO framework and provide a corresponding measurement on the Philippine economy using mainly the 1965 and 1969 input-output tables.[1] A measurement of the NIS basis will also be provided for comparative purposes.

Section II deals with methodology. Section III provides measurement on the Philippine economy.

II Growth Accounting from the Demand Side — Methodology

There may exist several alternative approaches to the growth accounting from the demand side, because we have no dominant theoretical basis for the demand side such as

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1) The 1961 input-output table will not be used in principle, because it is said that the table contains a misleading data compilation for the capital formation. (In other words, it is said that the data on investments in each industry are compiled there instead of the data on output of each industry delivered to capital formation.)

production function for the input side. Here we try to combine the analysis of import substitution (Chenery [1960]) and the constant-market-shares (CMS) analysis of exports (e.g., Richardson [1971]) consistently from the point of view of the latter.[2] We divide total market for domestic outputs into two parts: domestic market and world market, and decompose growth of domestic outputs into two effects: (i) *proportional growth effect* (P.G.E.) which corresponds to growth of total demands in both markets and (ii) *competitive effect* (C.E.) which corresponds to increase in shares in both markets, providing thus an accounting framework for the sources of growth from the demand side.

Let us begin with the CMS analysis applied to world market, which is the ordinary and well-known case. First, let us define Philippine share in world market of commodity i as

$$(1)\quad \beta_i \equiv E_i/W_i$$

where E_i=Philippine exports of commodity i, and W_i=world imports of commodity i. Then, differentiating with respect to time (denoted by dot (·)), we get

$$(2)\quad \dot{E}_i=\beta_i\cdot\dot{W}_i+W_i\cdot\dot{\beta}_i \quad \text{or} \quad \dot{E}_i/E_i=\dot{W}_i/W_i+\dot{\beta}_i/\beta_i,$$

from which we can see that increase in (or growth of) exports is caused by the two effects: increase in (or growth of) world imports with no change in market share, and increase in (or growth of) market share with no change in world imports. The former is, of course, proportional growth effect (P.G.E.) while the latter is competitive effect (C.E.) which may also be called *share effect*.

There have been not a few criticisms on this CMS analysis for exports.[3] Yet, we can raise an important criticism which has been hitherto overlooked. That is to say, the world imports (W_i) may not be an appropriate measure to indicate the size of world market so that the increase in market share (β_i) may not reflect competitive power in the proper manner. Take the U.S. market as an example. In the case of light industry products, the Philippines must compete in the U.S. market not only with other developing countries but also with the U.S. itself. In the case of automobiles, Toyota (Japanese automobile industry) must increase its share in the U.S. market competing not only with Folkswagen (German automobile industry) but also with Ford (U.S. domestic industry). In many cases, therefore, total domestic demands in each country may be better than imports only to be used as a measure for the size of world market.[4]

2) For the analysis of import substitution, see Shionoya [1968, Section IV] (Japan), Liang and Lee [1974, Section V] (Taiwan), Narongchai Akrasanee [1975] (Thailand), etc. For the CMS analysis of exports, see Balassa [1971, Chapter 2] (seven developing countries), Naya and Udom Kerdpibule [1973] (Southeast Asia), Liang and Lee [1974, Section VI] (Taiwan), Naya and Akrasanee [1976] (Thailand), etc.

3) See Richardson [1971], for example.

4) Total domestic demands include intermediate demands as well as final demands so that, in order to allow for this criticism in the actual measurement, several input-output tables are needed for each importing country in the world. In this paper, we will follow the ordinary CMS analysis of exports due to the limited availability of appropriate IO tables in the importing countries.

This criticism suggests that the CMS analysis is applicable also to the domestic market, because Philippine industries are competing with foreign ones in the Philippine domestic market also. In fact, we can derive the Chenery measure of import substitution from the point of view of the CMS analysis. First, note that total domestic demands of the Philippines are matched by both domestic and foreign supplies:

(3) $d_i = z_i + M_i$

where d_i=total domestic demands of commodity i, z_i=domestic outputs of commodity i delivered to domestic use, and M_i=Philippine imports of commodity i. Then, we can define Philippine share of commodity i in Philippine domestic market as

(4) $a_i \equiv z_i / d_i$.

Differentiating with respect to time, we get

(5) $\dot{z}_i = a_i \cdot \dot{d}_i + d_i \cdot \dot{a}_i$ or $\dot{z}_i / z_i = \dot{d}_i / d_i + \dot{a}_i / a_i$.

It is needless to say that P.G.E. and C.E. in the domestic market are identified with the first and the second terms respectively in the righthand side of each equation above. The C.E. here is identical with the measure of import substitution proposed by Chenery [1961, pp. 639-644].

As to the Chenery's measure of import substitution, Morley and Smith [1970] raised a criticism, and proposed a modified measure which explicitly allows for the interdependency between industries in the analysis of import substitution. It seems, however, to the author that their modified measure is not superior to the original one (see Appendix of this paper), so that we do not employ their analytical method and framework here.

Our next task, then, is to combine consistently both of the foreign and the domestic markets discussed above. It is clear for this purpose that the IO framework is better than the NIS framework since the latter describes the relationship between value added and final expenditures only, neglecting in a sense the intermediate demands and supplies.[5] Under the IO framework, we get the following basic identities for each industry:

(6) $y_i + M_i = d_i + E_i$

(7) $z_i \equiv y_i - E_i = d_i - M_i$

(8) $y_i = z_i + E_i$

where y_i=total output of industry i (or commodity i).[6] Equation (6) shows the *ex post* identity between supply and demand in each industry, i.e., total supply from both domestic and foreign sources must be equal to total demand of both domestic and foreign origins. Equation (7) is the definitional identity for the domestically used domestic output (z_i).

5) The same was true for the input side of growth accounting. See Ezaki [1976].

6) Capital letters Y, D and Z will be used for the corresponding variables under the NIS framework.

Here it is assumed that imported commodities are not used directly for exports. From this definition of z_i are derived the two identities: equations (3) and (8).[7)]

Now we can derive an identity for the growth of output from equations (8), (2) and (5):

$$(9)\quad \frac{\dot{y}_i}{y_i}=\frac{z_i}{y_i}\cdot\frac{\dot{z}_i}{z_i}+\frac{E_i}{y_i}\cdot\frac{\dot{E}_i}{E_i}$$
$$=\frac{z_i}{y_i}\left(\frac{\dot{d}_i}{d_i}+\frac{\dot{\alpha}_i}{\alpha_i}\right)+\frac{E_i}{y_i}\left(\frac{\dot{W}_i}{W_i}+\frac{\dot{\beta}_i}{\beta_i}\right)$$
$$=\left[\frac{z_i}{y_i}\cdot\frac{\dot{d}_i}{d_i}+\frac{E_i}{y_i}\cdot\frac{\dot{W}_i}{W_i}\right]+\left[\frac{z_i}{y_i}\cdot\frac{\dot{\alpha}_i}{\alpha_i}+\frac{E_i}{y_i}\cdot\frac{\dot{\beta}_i}{\beta_i}\right]$$

which shows that growth of output is decomposed into P.G.E. and C.E. in the weighted average sense. This is the basic formula for the growth accounting from the demand side. The formula, however, is expressed in terms of continuous time so that we need a corresponding discrete approximation in the actual measurement. The discrete expressions for equations (5) and (2) are:

$$(10)\quad \Delta z_i/z_i=\Delta d_i/d_i+\Delta\alpha_i/\alpha_i+(\Delta d_i/d_i)\cdot(\Delta\alpha_i/\alpha_i)$$

$$(11)\quad \Delta E_i/E_i=\Delta W_i/W_i+\Delta\beta_i/\beta_i+(\Delta W_i/W_i)\cdot(\Delta\beta_i/\beta_i)$$

where Δ means increase between two (i.e., base and succeeding) periods. Note that the third terms appear in addition to P.G.E.'s and C.E.'s in the above identities. They are caused by the changes in both total demands and market shares and called *interaction effect* (I.E.). The discrete expression for the basic formula (9), therefore, consists of three effects in the weighted average sense:

$$(12)\quad \frac{\Delta y_i}{y_i}=\frac{z_i}{y_i}\cdot\frac{\Delta z_i}{z_i}+\frac{E_i}{y_i}\cdot\frac{\Delta E_i}{E_i}$$
$$=\frac{z_i}{y_i}\left(\frac{\Delta d_i}{d_i}+\frac{\Delta\alpha_i}{\alpha_i}+\frac{\Delta d_i}{d_i}\cdot\frac{\Delta\alpha_i}{\alpha_i}\right)+\frac{E_i}{y_i}\left(\frac{\Delta W_i}{W_i}+\frac{\Delta\beta_i}{\beta_i}+\frac{\Delta W_i}{W_i}\cdot\frac{\Delta\beta_i}{\beta_i}\right)$$
$$=\text{P.G.E.}+\text{C.E.}+\text{I.E.}\qquad \text{(in the weighted average sense).}$$

This formula will be applied, in the next section, not only to the seven aggregate sectors (industries) used in the previous paper but also to the disaggregated components industries (though the disaggregation will be made for the manufacturing sector only). It seems, therefore, worthwhile to develop here in general form the relationships between aggregate and disaggregate measures.

Let us consider the world market first. There seems no need of explanation on the following identities for the k-th component industry in the i-th aggregate sector (industry):

$$(13)\quad \beta_{ik}\equiv E_{ik}/W_{ik}$$

7) In the measurement of Section 3, we estimate first z_i by (y_i-E_i) and then d_i by (z_i+M_i). Note that all variables (except for market shares) are measured either at current prices or at constant prices or both, depending on the data availability.

(14) $\Delta E_{ik}/E_{ik}=\Delta W_{ik}/W_{ik}+\Delta\beta_{ik}/\beta_{ik}+(\Delta W_{ik}/W_{ik})\cdot(\Delta\beta_{ik}/\beta_{ik})$

where β_{ik}=Philippine share of commodity k in world market, E_{ik}=Philippine exports of commodity k, and W_{ik}=world imports of commodity k. Then, using

(15) $E_i=\sum_k E_{ik}$ and $W_i=\sum_k W_{ik}$,

we get an identity for the growth of exports in the aggregate industry i:

(16) $$\frac{\Delta E_i}{E_i}=\sum_k \frac{E_{ik}}{E_i}\cdot\frac{\Delta E_{ik}}{E_{ik}}$$
$$=\sum_k \frac{E_{ik}}{E_i}\cdot\frac{\Delta W_{ik}}{W_{ik}}+\sum_k \frac{E_{ik}}{E_i}\cdot\frac{\Delta\beta_{ik}}{\beta_{ik}}+\sum_k \frac{E_{ik}}{E_i}\cdot\frac{\Delta W_{ik}}{W_{ik}}\cdot\frac{\Delta\beta_{ik}}{\beta_{ik}}$$

which is essentially identical with equation (11). All of the three terms in the right-hand side above are the weighted averages of components P.G.E.'s, C.E.'s and I.E.'s with the export composition as common weights, so that we can interprete them as the measures of pure P.G.E. (denoted by P.G.E.*), pure C.E. (denoted by C.E.*) and pure I.E. (denoted by I.E.*) respectively for the i-th industry. The difference between P.G.E.*, which is based on the disaggregate data, and P.G.E., which is based on the aggregate data, is called *commodity compositional effect* (C.C.E), because its sign and magnitude are dependent on the difference in composition between Philippine exports and world imports as well as on the growth of the latter:[8)]

(17) $$\text{C.C.E.}\equiv\text{P.G.E.*}-\text{P.G.E.}=\sum_k\left(\frac{E_{ik}}{E_i}-\frac{W_{ik}}{W_i}\right)\cdot\frac{\Delta W_{ik}}{W_{ik}}$$

where P.G.E.*$=\sum(E_{ik}/E_i)\cdot(\Delta W_{ik}/W_{ik})$ and P.G.E.$=\Delta W_i/W_i$. In other words, the stronger is the export concentration on the specific commodities growing fast in world market, the greater will be the magnitude of C.C.E. (and vice versa). Using this concept of C.C.E. and comparing equation (16) with equation (11), we get

(18) C.E.=C.E.*+C.C.E.+(I.E.*−I.E.)

which shows that the competitive effect based on the aggregate data (i.e., C.E.) includes C.C.E. in addition to the pure competitive effect based on the disaggregate data (i.e.. C.E.*).[9)]

So far was concerned about the world market. As to the domestic market also, we can define commodity compositional effect in the same way as equation (17):

(19) $$\text{C.C.E.}\equiv\text{P.G.E.*}-\text{P.G.E.}=\sum_k\left(\frac{z_{ik}}{z_i}-\frac{d_{ik}}{d_i}\right)\cdot\frac{\Delta d_{ik}}{d_{ik}}$$

where $z_i=\sum z_{ik}$ and $d_i=\sum d_{ik}$. The relationship between C.E. and C.E.* for industry

8) See Richardson [1971], footnote 3, p. 209.

9) (I.E.*−I.E.) is the residual under discrete approximation. It vanishes under continuous time.

i can be derived by comparing equation (10) with the counterpart of equation (16), and is the same as equation (18).

III Growth Accounting from the Demand Side — Measurement

In this section, we will provide a growth accounting from the demand side for the Philippine national economy comparing mainly two input-output tables: the 1965 table of National Economic Council (NEC) and the 1969 table of National Economic and Development Authority (NEDA). For the demand side, we will again aggregate more than fifty industries in the original IO tables into seven sectors in the same way as for the input side (Ezaki [1976]): (1) Agriculture (Agriculture, Fisheries and Forestry), (2) Mining (Mining and Quarrying), (3) Manufacturing, (4) Construction, (5) Transportation, etc. (Transportation, Communication, Warehousing and Storage, and Utilities), (6) Commerce (Trade, Banking, Insurance and Real Estate), and (7) Services (Private and Government Services).[10] For the manufacturing sector, however, we will show the disaggregate results also based on twenty components industries in order to derive more definite implications on the Philippine industrialization. Furthermore, we will provide here a measurement of the NIS basis using the national income statistics data, though the linkage between NIS and IO bases for the demand side is neither direct nor clear-cut compared to the case of input side.

Let us begin with the aggregate seven industries, first. Table 1 shows the final results obtained by applying formula (12) to the IO data (except for W_i) at both current and constant prices.[11] As is explained in detail in the Data Appendix of this paper, W_i (world imports of commodity i) is estimated (or approximated) by the sum of total imports of commodity i in *twenty* top trading partners of the Philippines from the point of view of the Philippine exports such as U.S., Japan, Netherlands, Korea, West Germany, and so on. The share of these twenty countries in total Philippine exports (all commodities) is 98.0% in 1965 and 97.3% in 1969, so that our estimate or approximation of W_i here does not seem to give misleading results. The data source for W_i is *UN Yearbook of International Trade Statistics,* in which exports of the Philippine industries are identified, one by one, with commodities in the world market on the basis of the Standard International Trade Classification (SITC). However, for the last three sectors of transportation, commerce and services, the corresponding data in world market are not available so that the world imports are assumed to grow at the same rates as the Philippine exports. In Table 1, the results at constant 1967 prices are shown in the second line of each row corresponding to each industry. The basic data for them are obtained by deflation. The deflators for y_i and E_i are the NIS

10) For the 1969 input-output table, an aggregate 12×12 table is available in the *NEDA Statistical Yearbook 1976*. However, we must be very careful in using it, because this aggregate table contains an erroneous classification of industries for the sectors of transportation, communication and warehousing (9th) and other services (12th).

11) See footnote 7 of this paper.

Table 1 Decomposition of Growth of Outputs (at current and constant prices): 1969/1965

	1	2	3	4	5	6	7	8	9	10	11	12
	2×3+6×7 or 10+11+12		4+5+4×5				8+9+8×9			2×4 + 6×8	2×5 + 6×9	2×4×5 + 6×8×9
Industries	$\Delta y_i/y_i$	z_i/y_i	$\Delta z_i/z_i$	$\Delta d_i/d_i$ P.G.E.	$\Delta a_i/a_i$ C.E.	E_i/y_i	$\Delta E_i/E_i$	$\Delta W_i/W_i$ P.G.E.	$\Delta \beta_i/\beta_i$ C.E.	P.G.E.	C.E.	I.E.
1. Agriculture	64.8% 17.5	.836	76.0% 25.5	72.0% 24.0	2.3% 1.2	.164	8.3% −22.8	29.6% 28.4	−16.5% −39.8%	65.0% 24.7	−0.8% −5.5	0.6% −1.6
2. Mining	135.8 72.0	.174	225.7 137.7	119.3 103.0	48.5 17.1	.826	116.8 58.2	44.4 44.4	50.2 9.6	57.4 54.6	49.9 10.9	28.5 6.6
3. Manufacturing	70.9 50.1	.897	74.4 53.3	65.8 47.6	5.2 3.8	.103	40.1 23.1	54.4 42.5	−9.2 −13.6	64.6 47.1	3.7 2.0	2.6 1.0
4. Construction	50.5 10.4	1.000	50.5 10.4	50.5 10.4	0.0 0.0	0.000	— —	— —	— —	50.5 10.4	0.0 0.0	0.0 0.0
5. Transp., etc.	67.5 43.3	.891	70.1 45.5	74.0 48.8	−2.3 (−2.3)	.109	46.3 25.2	(46.3) (25.2)	(0.0) (0.0)	71.0 46.2	−2.0 −2.0	−1.5 −1.0
6. Commerce	48.1 30.5	.909	55.5 37.0	55.0 36.6	0.3 (0.3)	.091	−25.4 −34.3	(−25.4) (−34.3)	(0.0) (0.0)	47.7 30.1	0.3 0.3	0.1 0.1
7. Services	36.4 8.3	.869	50.1 19.2	46.4 16.2	2.6 (2.6)	.131	−54.2 −63.6	(−54.2) (−63.6)	(0.0) (0.0)	33.2 5.7	2.3 2.3	1.0 0.4
Total Economy[a]	$\frac{\Delta y}{y}$	$\frac{z}{y}$	$\Sigma \frac{z_i}{z} \cdot \frac{\Delta z_i}{z_i}$	$\Sigma \frac{z_i}{z} \cdot \frac{\Delta d_i}{d_i}$ P.G.E.*	$\Sigma \frac{z_i}{z} \cdot \frac{\Delta a_i}{a_i}$ C.E.*	$\frac{E}{y}$	$\Sigma \frac{E_i}{E} \cdot \frac{\Delta E_i}{E_i}$	$\Sigma \frac{E_i}{E} \cdot \frac{\Delta W_i}{W_i}$ P.G.E.*	$\Sigma \frac{E_i}{E} \cdot \frac{\Delta \beta_i}{\beta_i}$ C.E.*	P.G.E.*	C.E.*	I.E.*
	58.9% 30.3	.880 .879	65.4% 36.0	61.1% 33.4	2.6% 1.9	.120 .121	11.7% −10.6	15.1% 7.6	−3.0% −13.9	55.6% 30.3	1.9% −0.0	1.3% +0.0

[a]Notation for total economy: $y = \sum y_i$, $z = \sum z_i$, and $E = \sum E_i$.

deflators which were used in the previous paper,[12] while those for W_i and M_i are the price or unit value indexes of world exports of market economies.[13] Again for the last three sectors of transportation, commerce and services, the NIS deflators are used to deflate W_i and M_i also due to the lack of appropriate data.

Though the table contains some unreliable portions caused by the insufficient data, we can say that, between 1965 and 1969, output in each industry grew almost in proportion to total demands of both domestic and foreign markets, because P.G.E. (column 10) is dominant while C.E. (column 11) is quite small. The exception is the mining industry. Its output growth, which is very large compared to the other industries, receives significant contributions from both P.G.E. and C.E. This is mainly due to the rapid increases in production and export of copper during this period (i.e., 255% and 185% respectively in value).[14] In the agricultural sector, on the other hand, the competitive effect in the world market (column 9) is not only significant but also negative. The result is also due to a specific reason. In other words, the exports of coconut and copra, whose share in total agricultural exports was almost 50% in 1965, decreased considerably between 1965 and 1969 (i.e., −35.6% in value based on the IO data), causing a low growth of total agricultural exports and a negative share-increase in world agricultural market.[15] A similar result is obtained for the manufacturing sector where the import substitution effect (column 5) is moderate and the competitive effect in world market (column 9) is even negative. Let us investigate in more detail below the case of manufacturing industry whose performance is closely related to the process of Philippine industrialization.

Table 2 shows the disaggregate results for twenty components industries in the manufacturing sector, which are obtained by applying the same formula (12) and expressed only at current prices due to the lack of price data. From the table we can see that, in almost every component industry, P.G.E. (column 10) is dominant while C.E. (column 11) is positive but small. The results on total or average effects (columns 10 and 11) correspond to those on components effects in the domestic market (columns 4 and 5), because the ratio of domestic use to domestic production (column 2) is close to one in many industries (.897 on the average), making the domestic market dominant over the export market. For the domestic market

12) See Table 4 of Ezaki [1976] and the related discussions on the NIS deflators there. The export price indexes should be used to deflate E_i if such data are available.

13) See Data Appendix of this paper. The import price indexes of the Philippines should be used to deflate M_i if such data are available.

14) The value shares of copper production in total metallic production and total mining production are, respectively, 49% and 32% in 1965 while 74% and 54% in 1969. See *Philippine Yearbook 1975,* Tables XV. 1 and XV. 4 and *NEDA Statistical Yearbook 1975,* Table 12.6.

15) Precisely speaking, we must allow also for the commodity compositional effect as in the case of manufacturing sector discussed below. Balassa [1971, Table 2.6, p. 43] provides the results of CMS analysis for several commodities of the Philippine exports comparing 1950–53 with 1963–66. Judging from our results above, it seems that there occurred in the early 1960's a structural change in the Philippine agricultural exports in relation to copra and logs.

Table 2 Decomposition of Growth of Manufacturing Outputs (at current prices): 1969/1965

Industries[a]	1	2	3	4	5	6	7	8	9	10	11	12
	$\Delta y_k/y_k$	z_k/y_k	$\Delta z_k/z_k$	$\Delta d_k/d_k$	$\Delta a_k/a_k$	E_k/y_k	$\Delta E_k/E_k$	$\Delta W_k/W_k$	$\Delta \beta_k/\beta_k$	P.G.E.	C.E.	I.E.
1. Food manuf.	55.3%	.892	59.0%	50.5%	5.7%	.108	34.1%	19.6%	12.1%	47.2%	6.4%	2.8%
2. Beverages	90.5	.994	89.5	84.8	2.5	.006	262.1	32.3	173.3	84.5	3.5	2.4
3. Tobacco prod.	63.8	.919	68.5	79.9	−6.3	.081	9.8	25.0	−12.2	75.5	−6.8	−4.5
4. Textiles etc.	134.8	.850	149.3	124.3	11.1	.151	53.5	38.7	10.7	111.5	11.1	12.3
5. Wood prods.	63.7	.644	73.4	70.7	1.5	.356	46.1	44.8	0.9	61.5	1.3	0.8
6. Furniture etc	165.4	.977	160.9	162.7	−0.7	.023	361.3	142.2	90.5	162.2	1.4	1.8
7. Paper	57.6	.99999	55.0	47.2	5.3	.00001	196133.3	37.5	14212.0	47.2	5.5	2.6
8. Printing	25.7	.999	23.4	30.8	−5.6	.001	2350.6	79.6	1265.1	30.8	−4.3	−0.7
9. Leather	157.8	.998	158.1	127.0	13.7	.002	−83.3	63.2	−89.8	126.9	13.5	17.3
10. Rubber prod.	57.6	.998	55.8	50.1	3.8	.002	793.5	27.2	602.9	50.1	5.0	2.2
11. Chemicals	53.7	.727	78.0	64.1	8.5	.273	−10.2	50.1	−40.6	60.3	−4.9	−1.6
12. Petroleums	86.9	.964	80.2	62.7	10.8	.036	262.2	27.8	183.5	61.4	17.0	8.4
13. Non-metallic minerals	97.1	.99999	94.4	81.4	7.2	.00001	234066.7	48.8	157199.5	81.4	8.8	6.6
14. Basic metals	183.5	.974	166.8	97.2	35.3	.026	812.3	56.3	483.3	96.1	46.9	40.5
15. Metal prod.	69.8	.997	69.2	55.0	9.2	.003	304.9	61.5	150.8	55.0	9.6	5.3
16. Machinery	177.6	.988	175.9	83.7	50.2	.012	319.7	61.2	160.8	83.4	51.5	42.7
17. Electric mach.	83.9	.997	79.6	71.4	4.8	.003	1687.9	91.3	835.6	71.5	7.3	5.7
18. Transp. equip.	55.6	.9997	52.4	59.7	−4.6	.0001	9316.5	128.4	4023.4	59.7	−4.2	−2.2
19. Miscel. manuf.	132.4	.941	109.2	27.8	63.7	.059	504.5	66.5	263.2	30.1	75.5	27.0
20. Scrap	164.3	1.000	164.3	164.3	—	—	—	—	—	—	—	—
Total Manufacturing[b]	$\frac{\Delta y_M}{y_M}$	$\frac{z_M}{y_M}$	$\sum \frac{z_k}{z_M} \cdot \frac{\Delta z_k}{z_k}$	$\sum \frac{z_k}{z_M} \cdot \frac{\Delta d_k}{d_k}$ (P.G.E.)	$\sum \frac{z_k}{z_M} \cdot \frac{\Delta a_k}{a_k}$ (C.E.)	$\frac{E_M}{y_M}$	$\sum \frac{E_k}{E_M} \cdot \frac{\Delta E_k}{E_k}$	$\sum \frac{E_k}{E_M} \cdot \frac{\Delta W_k}{W_k}$ (P.G.E.)	$\sum \frac{E_k}{E_M} \cdot \frac{\Delta \beta_k}{\beta_k}$ (C.E.)	P.G.E.* (P.G.E.)	C.E.* (C.E.)	I.E.* (I.E.)
	70.9	.897	74.4	63.4	6.4	.103	40.1	23.3	6.0	60.2	6.4	3.8
(Table 1)	(〃)	(〃)	(〃)	(65.8)	(5.2)	(〃)	(〃)	(54.4)	(−9.2)	(64.6)	(3.7)	(2.6)

[a]See Table A2 (Data Appendix) for their exact names. [b]$y_M = \sum y_k$, $z_M = \sum z_k$, and $E_M = \sum E_k$ (M: manufacturing).

the disaggregate results of Table 2 are quite similar to the aggregate results of Table 1 (which are shown also in the last row of Table 2). That is to say, during the period in question, the effect of import substitution is moderate in most industries except for some of the heavy industries (i.e., basic metals and machineries other than electrical ones),[16] and there exists no big discrepancy between P.G.E.* (63.4%) and P.G.E. (65.8%) or between C.E.* (6.4%) and C.E. (5.2%). For the world market, however, the disaggregate results are conspicuous in that C.E. (column 9) is not only significantly positive but also more important than P.G.E. (column 8) in many cases.[17] As a result, the pure competitive effect of total manufacturing sector (C.E.*) is significantly positive (6.0%), explaining 15% of its export growth (40.1%), and there arises a considerable discrepancy between C.E.* (6.0%) and C.E. (−9.2%). As can be seen from equation (18), this discrepancy is caused mainly by the commodity compositional effect (C.C.E.) for which a large negative value (−22.1%) is obtained here according to equation (17).

Then, what is the reason why such a large negative value is observed for the C.C.E. of world market? The answer can be found in Table 3 which shows the breakdown of C.C.E.'s in the manufacturing sector for the world market as well as for the domestic market. A notable fact on the world market is that the Philippine exports concentrate heavily on the products of food manufacturing industry (column (7) to be compared with column (8)), while the growth of world demand for the manufactured food is lowest among the products of nineteen industries under consideration (column (11)). Therefore, the positive contribution to C.C.E. of food manufacturing industry (7.3%, column (12)) is small relative to its large compositional gaps between Philippine exports and world imports (.37327, column (9)). The same may be true, though to a lesser extent, for the exports of chemical industry whose major component is coconut oil.[18] As a result of this heavy concentration of exports on food manufacturing (and probably on chemicals), the commodity compositional gaps in other industries become negative and large (column (9)), causing significant negative contributions to C.C.E. (column (12)). This is true especially in the case of heavy industries where the world demands for their products are growing quite rapidly (column (11)). For

16) It is needless to say that the effect of import substitution is, more or less, negatively correlated with the level of α. The data on α in twenty components industries in 1965 are as follows: (1). 890, (2). 951, (3) .978, (4) .643, (5) .968, (6).988, (7). 620, (8) .911, (9) .840, (10) .838, (11) .611, (12) .841, (13) .813, (14) .338, (15) .660, (16) .106, (17) .450, (18) .448, (19) .365, (20) 1.000. Total manufacturing=.764 (the weighted average of components α's in 1965).

17) The extraordinarily big figures in columns 7 and 9 correspond to the case where exports and market shares are very small in the base year 1965. The data on β in 1965 are as follows: (1) .0140194, (2) .0006131, (3) .0143846, (4) .0023201, (5) .0122571, (6) .0012752, (7) .0000002, (8) .0001238, (9) .0000271, (10) .0000618 (11) .0075037, (12) .0014261, (13) .0000002, (14) .0001135, (15) .0001248, (16) .0000212, (17) .0000267, (18) .0000043, (19) .0003438, Total manufacturing=.0032752 (the weighted average of components β's in 1965).

18) The share of coconut and other oils and fats in total chemical exports is 90.7% in 1969 (based on the IO data).

Table 3 Breakdown of C.C.E.'s in the Manufacturing Industry (at current prices): 1969/1965

Industries	Domestic Market						World Market					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	z_{ik}/z_i 1965	d_{ik}/d_i 1965	(1)–(2) 1965	(3) in 1969	$\frac{\Delta d_{ik}}{d_{ik}}$	C.C.E.[a] (3)×(5)	E_{ik}/E_i 1965	W_{ik}/W_i 1965	(7)–(8) 1965	(9) in 1969	$\frac{\Delta W_{ik}}{W_{ik}}$	C.C.E.[b] (9)×(11)
1. Food manuf.	.46136	.37702	.08434	.07898	50.5%	4.3%	.48706	.11379	.37327	.37807	19.6%	7.3%
2. Beverages	.04177	.03192	.00985	.00985	84.8	0.8	.00225	.01200	−.00975	−.00448	32.3	−0.3
3. Tobacco prod.	.06050	.04498	.01552	.00970	79.9	1.2	.04657	.01060	.03597	.02788	25.0	0.9
4. Textiles etc.	.06213	.07025	−.00812	−.00617	124.3	−1.0	.09571	.13511	−.03940	−.01654	38.7	−1.5
5. Wood prods.	.02153	.01618	.00535	.00477	70.7	0.4	.10338	.02762	.07576	.08188	44.8	3.4
6. Furniture etc.	.00597	.00439	.00158	.00198	162.7	0.3	.00120	.00307	−.00187	−.00088	142.2	−0.3
7. Paper	.02232	.02618	−.00386	−.00339	47.2	−0.2	.00000	.04259	−.04259	−.03433	37.5	−1.6
8. Printing	.02563	.02045	.00518	.00202	30.8	0.2	.00021	.00564	−.00543	−.00284	79.6	−0.4
9. Leather	.00294	.00255	.00039	.00087	127.0	0.0	.00004	.00498	−.00494	−.00525	63.2	−0.3
10. Rubber prod.	.01894	.01643		.00206	50.1	0.1	.00040	.02111	−.02071	−.01485	27.2	−0.6
11. Chemicals	.07147	.08510	−.01363	−.01124	64.1	−0.9	.23389	.10209	.13180	.04957	50.1	6.6
12. Petroleums	.05462	.04722	.00740	.01014	62.7	0.5	.01797	.04128	−.02331	.01230	27.8	−0.6
13. Non-metallic minerals	.02586	.02312	.00274	.00355	81.4	0.2	.00000	.04196	−.04196	−.03616	48.8	−2.0
14. Basic metals	.01746	.03758	−.02012	−.01800	97.2	−2.1	.00403	.11621	−.11218	−.09146	56.3	−6.3
15. Metal prod.	.03578	.03940	−.00362	−.00209	55.0	−0.2	.00084	.02140	−.02056	−.01997	61.5	−1.3
16. Machinery	.00757	.05170	−.04413	−.04536	83.7	−3.7	.00079	.12156	−.12077	−.12459	61.2	−7.4
17. Electric mach.	.01836	.02964	−.01128	−.01174	71.4	−0.8	.00042	.05126	−.05084	−.05819	91.3	−4.6
18. Transp. equip.	.03407	.05533	−.02126	−.02352	59.7	−1.3	.00010	.07878	−.07868	−.10956	128.4	−10.1
19. Miscel. manuf.	.00950	.01893	−.00943	−.00319	27.8	−0.3	.00514	.04894	−.04380	−.03060	66.5	−2.9
20. Scrap	.00223	.00162	.00061	.00080	164.3	0.1	—	—	—	—	—	—
Total Manufact.[c]	1.0	1.0	0.0	0.0		−2.3	1.0	1.0	0.0	0.0		−22.0

[a]See equation (19). [b]See equation (17). [c]Column sums.

the C.C.E. in the succeeding period, say 1969–1973 (though the required IO data are not available yet), we can expect that a large negative value will be observed again, since the commodity compositional gaps in 1969 (column (10)) are not so much different from those in 1965 (column (9)). For the domestic market, on the other hand, we can say based on the similar analyses that a strong concentration of domestic supplies on food manufacturing industry is the main reason for the negative C.C.E. (−2.3%). However, the C.C.E. here is small in absolute value because domestic supplies are generally dominant over foreign supplies (i.e., imports) in the domestic market,[19] resulting in small compositional gaps between domestic supplies and total domestic demands (column (3)).

These observations on the performance of the manufacturing sector and its components industries lead us to a somewhat definite conclusion about the Philippine industrialization during the period between 1965 and 1969. That is to say, the Philippine industrialization was successful during this period in the sense that most of the components industries of the manufacturing sector strengthened their competitive powers in both of the domestic and world markets. At the same time, however, the competitive power of the manufacturing sector as a whole was weakened, to a small extent in the domestic market while considerably in the world market, due to the unfavorable effects of commodity composition caused by the heavy concentration on the food manufacturing industry in both markets. As to the Philippine economic growth in the postwar period, it is often argued that the easy phase or exuberant stage in import-substituting industrialization was over by the end of the 1950's.[20] Our observations and conclusion above seem to indicate that the second stage of import substitution in the backward linkage industries and the export expansion proceeded smoothly in the second half of the 1960's. The second stage, actually, was more explicit in this period than in the first half of the 1960's since, as is shown in Table 4,[21] the effect of import substitution (column 5) was negative in general and negatively large in some of the heavy industries during the period between 1961 and 1965.[22]

So far was concerned about the individual sectors and industries. For the total economy, Table 1 (the last two rows) gives a measurement of the IO basis derived by aggregating seven components sectors.[23] The result is given, of course, in terms of gross (total) output, so that

19) See the data on a in footnote 16.

20) See, for example, Power and Sicat [1971], Chapter 2.

21) Note that Table 4 is based on the 1961 input-output table which contains an erroneous data compilation on the capital formation (footnote 1). However, its effect on the final results seems to be small judging from the comparison of capital formation between 1961 and 1965 tables.

22) The unfavorable performance of manufacturing industries in the domestic market during 1961–1965, contrasted with the favorable performance during 1965–1969, may reflect the exchange control policies in the 1960's, because the former period can be characterized as the phase of continued decontrol and devaluation while the latter as the phase of return to moderate exchange control after the phase of complete liberalization. See Robert E. Baldwin [1975], Table 1–6, p. 12. The favorable performance in the world market, on the other hand, seems due mainly to the continued devaluation during this period.

23) Note that this is only an approximate result due to the insufficient data (especially for the world market).

Table 4 Decomposition of Growth of Manufacturing Outputs (at current prices): 1965/1961

Industries	1	2	3	4	5	6	7	8	9	10	11	12
	$\Delta y_k/y_k$	z_k/y_k	$\Delta z_k/z_k$	$\Delta d_k/d_k$	$\Delta \alpha_k/\alpha_k$	E_k/y_k	$\Delta E_k/E_k$	$\Delta W_k/W_k$	$\Delta \beta_k/\beta_k$	P.G.E.	C.E.	I.E.
1. Food manuf.	73.8%	.891	74.1%	75.9%	−1.0%	.109	71.9%	50.4%	14.4%	73.1%	0.7%	0.1%
2. Beverages	12.7	.998	12.3	16.0	−3.2	.002	249.3	41.1	147.5	16.1	−2.9	−0.4
3. Tobacco prod.	81.8	.955	74.8	65.8	5.5	.045	232.1	36.0	144.1	64.5	11.8	5.8
4. Textiles etc.	36.5	.989	17.3	16.4	0.8	.011	1686.6	50.1	1089.8	16.8	12.8	6.1
5. Wood prods.	27.5	.870	−5.5	−3.4	−2.2	.130	248.3	48.8	133.9	3.4	15.5	8.6
6. Furniture etc.	36.8	.991	34.9	34.6	0.3	.009	241.3	175.4	23.8	35.9	0.5	0.5
7. Paper	72.0	.99999	72.0	41.5	21.6	.00001	200.0[a]	57.5	90.1	41.5	21.6	9.0
8. Printing	86.8	.99962	86.7	84.4	1.3	.00038	369.8	92.7	143.7	84.4	1.4	1.1
9. Leather	39.0	.99995	38.7	22.2	13.5	.00005	4700.0[a]	62.8	2852.1	22.2	13.6	3.1
10. Rubber prod.	25.4	.99992	25.1	32.9	−5.8	.00008	2875.0	42.9	2610.5	32.9	−5.6	−1.8
11. Chemicals	92.3	.928	50.5	60.2	−6.0	.072	632.4	79.8	307.8	61.6	16.6	14.3
12. Petroleums	42.5	.99997	37.3	24.0	10.7	.00003	174658.3	51.1	115561.0	24.0	14.2	4.3
13. Non-metallic minerals	82.3	.99982	82.4	78.5	2.2	.00018	−88.5	114.4	−94.6	78.5	2.2	1.7
14. Basic metals	8.9	.99993	6.1	43.9	−26.3	.00007	39041.7	76.4	22111.4	43.9	−24.7	−10.4
15. Metal prod.	125.0	.998	124.9	113.7	5.2	.002	215.8	82.3	73.2	113.6	5.3	6.0
16. Machinery	−38.4	.99953	−39.1	40.1	−56.5	.00047	1459.3	107.4	650.4	40.1	−56.2	−22.3
17. Electric mach.	81.4	.99999	80.9	97.7	−8.5	.00001	48700.0[a]	111.2	22917.2	97.7	−8.3	−8.0
18. Transp. equip.	133.7	.99999	133.6	100.0	16.9	.00001	5950.0	120.6	2646.5	100.0	16.9	16.9
19. Miscel. manuf.	44.7	.978	39.2	105.6	−32.3	.022	289.9	141.2	61.7	106.4	−30.2	−31.4
20. Scrap[b]	—	—	—	—	—	—	—	—	—	—	—	—
Total Manufacturing	$\frac{\Delta y_M}{y_M}$	$\frac{z_M}{y_M}$	$\Sigma\frac{z_k}{z_M}\cdot\frac{\Delta z_k}{z_k}$	$\Sigma\frac{z_k}{z_M}\cdot\frac{\Delta d_k}{d_k}$ (P.G.E.)	$\Sigma\frac{z_k}{z_M}\cdot\frac{\Delta \alpha_k}{\alpha_k}$ (C.E.)	$\frac{E_M}{y_M}$	$\Sigma\frac{E_k}{E_M}\cdot\frac{\Delta E_k}{E_k}$	$\Sigma\frac{E_k}{E_M}\cdot\frac{\Delta W_k}{W_k}$ (P.G.E.)	$\Sigma\frac{E_k}{E_M}\cdot\frac{\Delta \beta_k}{\beta_k}$ (C.E.)	P.G.E.* (P.G.E.)	C.E.* (C.E.)	I.E.* (I.E.)
	63.4	.938	56.2	58.4	−1.4	.062	172.5	52.7	74.8	58.0	3.3	1.7
	(〃)	(〃)	(〃)	(58.2)	(−1.3)	(〃)	(〃)	(75.6)	(55.2)	(59.3)	(2.2)	(1.9)

[a]0 (zero) in the 1961 IO table so that 1 (one thousand pesos) is used in computation. [b]Not available in 1961.

Table 5 Decomposition of Growth of GNP (at constant 1967 prices): 1956–1974

	1	2	3	4	5	6	7	8	9	10	11	12	13	
	$\Delta Y/Y$	Z/Y	$\Delta Z/Z$	$\Delta D/D$	$\Delta\alpha/\alpha$	E/Y	$\Delta E/E$	$\Delta W/W$	$\Delta\beta/\beta$	P.G.E.	C.E.	I.E.	α	β
1957/56	5.1%	.844	7.2%	8.9%	−1.5%	.156	−6.1%	3.9%	−9.6%	8.1%	−2.8%	−0.2%	/.792	/.00950
58/57	3.9	.860	5.3	1.2	4.1	.140	−4.4	−3.7	−0.7	0.5	3.4	0.0	.780	.00859
59/58	6.6	.871	8.6	4.0	4.4	.129	−6.6	11.3	−16.1	4.9	1.8	−0.1	.812	.00853
60/59	2.0	.887	−0.1	1.4	−1.5	.113	18.5	8.5	9.2	2.2	−0.3	0.1	.848	.00716
61/60	6.4	.869	6.9	6.0	0.8	.131	3.3	5.7	−2.3	6.0	0.4	0.0	.836	.00782
62/61	5.6	.873	4.1	3.6	0.5	.127	15.9	8.0	7.3	4.2	1.4	0.1	.842	.00763
63/62	7.0	.861	5.1	3.6	1.4	.139	19.1	8.6	9.7	4.3	2.6	0.2	.846	.00819
64/63	2.5	.845	1.9	4.5	−2.5	.155	6.0	9.4	−3.1	5.3	−2.6	−0.1	.859	.00898
65/64	5.2	.840	3.6	4.0	−0.4	.160	13.6	8.5	4.7	4.7	0.4	0.1	.837	.00870
66/65	4.8	.827	4.6	4.6	−0.0	.173	6.1	9.9	−3.5	5.5	−0.6	−0.1	.834	.00911
67/66	5.8	.825	6.4	9.1	−2.5	.175	3.3	5.8	−2.3	8.5	−2.5	−0.2	.833	.00879
68/67	5.2	.829	8.2	8.1	0.1	.171	−9.9	14.2	−20.3	9.1	−3.4	−0.5	.812	.00859
69/68	5.9	.852	7.8	5.8	1.8	.148	−5.1	11.6	−15.0	6.7	−0.7	−0.2	.813	.00685
70/69	5.7	.867	5.0	2.7	2.2	.133	9.8	8.3	1.4	3.4	2.1	0.1	.828	.00582
71/70	6.2	.862	5.4	4.0	1.4	.138	11.0	6.1	4.6	4.3	1.8	0.1	.846	.00590
72/71	4.2	.856	1.8	1.5	0.3	.144	18.1	9.3	8.1	2.6	1.4	0.1	.858	.00617
73/72	9.8	.837	9.9	10.3	−0.4	.163	9.4	11.9	−2.3	10.6	−0.7	−0.1	.861	.00667
74/73	5.7	.837	12.2	13.3	−1.0	.163	−27.8	3.2	−30.0	11.7	−5.7	−0.3	.858	.00652
1961/57	20.0%	.860	22.1%	13.1%	7.9%	.140	9.2%	22.9%	−11.2%	14.5%	5.2%	0.5%	/.780	/.00859
65/61	21.9	.873	15.4	16.6	−1.0	.127	66.1	39.2	19.3	19.5	1.6	0.8	.842	.00763
69/65	23.6	.827	29.6	30.5	−0.7	.173	−5.3	48.2	−36.1	33.6	−6.8	−3.2	.834	.00911
73/69	28.3	.867	23.9	19.6	3.6	.133	57.4	40.6	12.0	22.4	4.7	1.3	.828	.00582

Basic identities: $Y+M=D+E$, $Z=Y-E=D-M$, $Y=Z+E$, $\alpha=Z/D$ and $\beta=E/W$.

Data sources: *National Income Series* (NEDA), *Statistical Yearbook* (NEDA), *Yearbook of International Trade Statistics* (UN), etc.

it seems worthwhile for comparative purposes to provide here a corresponding result in terms of GNP (i.e., measurement of the NIS basis). There exists no meaningful linkage between IO and NIS bases unlike the case of growth accounting from the input side, mainly because it is not reasonable to compare GNP (total final expenditures) directly with imports in the domestic market. Therefore, our measurement of the NIS basis here is derived only by analogy without any theoretical rationale for the domestic market, replacing y (total output) by Y (GNP or total value added), z (total domestic supply to domestic market) by Z (total domestic supply to domestic final market), and d (total domestic demand) by D (total domestic final demand). The results at constant 1967 prices are presented in Table 5 for the period 1957–1974 annually.[24] We must be careful in reading the table that P.G.E.'s and C.E.'s are measured on the basis of the highly aggregated national income data which probably generate high levels of C.C.E.'s in both markets. Though the results shown in Table 5 not only lack their theoretical background for the domestic market but also miss the detailed informations on the components sectors and industries, they are useful to get a rough idea on the sources of GNP growth from the demand side and to supplement the measurement of the IO basis constrained by the limited availability of input-output tables.

IV Concluding Remarks

We have presented, in this paper, a methodological framework for the growth accounting from demand side on the basis of the input-output tables by applying the constant-market-shares (CMS) analysis of exports consistently to both of the domestic and world markets. Using this framework, we have provided a measurement on the Philippine economy in the form of comparing mainly the 1965 and 1969 input-output tables of NEC and NEDA, and investigated in some details the process of Philippine industrialization in the 1960's.

Our measurement and analysis, however, are limited in many respects mainly due to the scarcity of available data. For example, first, various components demands in the domestic market are not distingushed explicitly here so that such demand factors as consumption, investment and intermediate expenditures are treated completely in the same manner. Second, similarly in the world market, differences between components individual markets (countries) are not explicitly allowed for, neglecting the so called *market compositional effect* of the ordinary CMS analysis. Third, also in the world market, the role of domestic industry as the competitor in each importing country is neglected by regarding only imports as the measure for the market size. Fourth, the measurement and analysis here are made only for the period between 1965 and 1969, or at most for the 1960's (though the 1957–1974 period is covered in a rough way by the measurement of the NIS basis). Finally, the com-

24) The national income data for 1956–1960 are obtained from Canlas, Encarnacion and Ho [1975], Table 1. The world imports (W) are again estimated by the sum of total imports (all commodities) of the same twenty countries. The deflator for W is the price or unit value index (all commodities) of world exports of market economies.

parison between growth accounting of the demand side and that of the input side is possible only for the aggregate seven sectors but not for the detailed components industries.[25)]

These limitations, of course, must be lessened and eliminated one by one in accordance with the improved data availability. At the same time, similar analyses must be made on the other developing countries in East and Southeast Asia (Korea, Taiwan, other ASEAN countries, etc.) as well as on Japan, because the international comparison may possibly shed some light on the process of Philippine economic development. The analysis by international comparison on both input and demand sides will be the major topic of the author's future researches.

Appendix. Note on the Morley-Smith Measure of Import Substitution

Morley and Smith [1970] criticized the Chenery's measure of import substitution as employing a narrow definition of imports, and proposed a new measure by expanding the concept of imports to include the intermediate demands generated by import susbtitution. In this appendix, we will raise several criticisms against their proposal, from which it may be concluded that their measure of import substitution is somewhat misleading or at least not superior to the ordinary one.

Their analytical framework can be summarized as follows using their own notation and equation numbers:

(2) $x_i + m_i = f_i + \sum a_{ij} x_j \qquad (i = 1 \ldots n)$

where m_i=imports, x_i=gross production, f_i=final demand, both domestic and foreign, and a_{ij}=observed imput-output coefficient

(3) $[I-A]x + m = f$ (in matrix notation)

(4) $x + [I-A]^{-1} m = [I-A]^{-1} f$

(5) $m^* = [I-A]^{-1} m$=the vector of redefined imports

(6) $z^* = x + m^*$=the new vector of total supply.

According to their explanations, m^* in equation (5) is the correct concept of imports to be used in the analysis of import substitution, since it values imports on a comparable basis with domestic production by allowing for implicit imports due to the intermediate demands generated by import substitution. In fact, m^* seems to be a measure for the equivalent of imports in domestic production ,but it is so only in a limited and unrealistic situtaion.

To clarify this, we consider, first, the case of two industries (i.e., $n=2$) without losing any generalities, and rewrite equation (5) as:

(A1) $$\begin{bmatrix} m_1^* \\ m_2^* \end{bmatrix} = [I-A]^{-1} \begin{bmatrix} m_1 \\ m_2 \end{bmatrix} = \begin{bmatrix} m^*_{1,1} \\ m^*_{2,1} \end{bmatrix} + \begin{bmatrix} m^*_{1,2} \\ m^*_{2,2} \end{bmatrix}$$

where $\begin{bmatrix} m^*_{1,1} \\ m^*_{2,1} \end{bmatrix} \equiv [I-A]^{-1} \begin{bmatrix} m_1 \\ 0 \end{bmatrix}$ and $\begin{bmatrix} m^*_{1,2} \\ m^*_{2,2} \end{bmatrix} \equiv [I-A]^{-1} \begin{bmatrix} 0 \\ m_2 \end{bmatrix}$

25) This is due to the insufficient availability of capital stock data in each industry.

Note that $m^*_{1,1}$ and $m^*_{2,1}$ represent the reqiured increases in outputs of both industries to substitute m_1 completely by domestic production. $m^*_{1,1}$ consists not only of direct substitution (i.e., m_1) but also of indirect substitution (i.e., implicit imports), while $m^*_{2,1}$ consisits only of indirect one. The same is true for $m^*_{1,2}$ and $m^*_{2,2}$ except the fact that they correspond to the case of substituting m_2 domestically. Now we can see from equation (A1) that m_1^* $(=m^*_{1,1}+m^*_{1,2})$ or $m_2^*(=m^*_{2,1}+m^*_{2,2})$ consists of these direct and indirect effects in substituting *both* m_1 and m_2 *simultaneously* by domestic production. Therefore, m_1^* is not the equivalent of m_1 in domestic production since $(m^*_{1,1}\ m^*_{2,1})$ is a reasonable one (though under the present context only). Similarly, m_2^* is not the equivalent of m_2 in domestic production since $(m^*_{2,1}\ m^*_{2,2})$ is a resonable one. Only as the set, m^* (the redefined import vector) may be considered as a resonable equivalent of m (the original import vector) in domestic production, so that the meaning of m^* is vague or at least not direct. Actually, their illustrative explanations to justify m^* (given in second, third and fourth paragraphs at p. 729) are all related to either $(m^*_{1,1}\ m^*_{2,1})$ or $(m^*_{1,2}\ m^*_{2,2})$ but not both.

Even if m^* as the vector is not meaningless, it is the concept derived under the unrealistic assumption of constant f (i.e., unchanged final demand). This can be understood in the following way. Equation (2), which is

(A2) $x+m=f+\mathrm{A}x$

in matrix notation, shows the actual or onserved situation. Suppose that imports are completely substituted by increasing domestic outputs with no change in final demand:

(A3) $x^*=f+Ax^*$

This is a hypothetical situation. Then, we get

(A4) $x^*-x=[I-A]^{-1}m=m^*$

which sows that m^* is the required increase in output to replace m domestically with no change in f. However, it is not possible to increase domestic outputs without using more capitals or without the increase in captial formation which means the change in f. On the other hand, greater domestic outputs reuire greater labor inputs which may lead to the increase in consumption. Therefore, m^* is the concept derived by comparing the actual situation (equation (A2)) with an impossible or unrealistic hypothetical situation (equation (A3)). Furthermore, equation (4) corresponds to the supply-demand equilibrium relations in this hypothetical situation, since its left-hand side is the new vector of total supply with the import component redefined by domestic equivalent while its right-hand side is the vector of total demand requreid to sustain the observed f domestically (See equation (A3)). There is no reason why the hypothetical supply-demand relations shown by equation (4) are better than the ordinary and natural ones shown by equation (2) or (A2) which values imports on a comparable basis with domestic outputs as far as the former is competitive with the latter.

Data Appendix: World Imports (*Wi*)

(i) Definition of world market. In this paper, the world market is defined as the group of twenty top trading partners in 1969 which are listed in Table A-1. Note that Indonesia and Malaysia do not belong to this group of top twenties but they are included in our world market in place of South Africa (19th) and Belgium (20th) only by reason of ASEAN countries.

(ii) Identification of commodities between Philippine IO tables and UN trade statistics. The data for Philippine exports are those of the input-output tables, while the data on world imports are based on the *UN Yearbook of International Trade Statistics* which classifies commodity transactions according to the Standard International Trade Classification (SITC). Here, the Philippine exports of the IO basis are identified one by one with the commodities of the SITC basis by using *Foreign Trade Statistics of the Philippines* (1969 issue, Bureau of the Census and Statistics) which provides detailed data on Philippine exports based on the SITC. Table A-2 shows this identification in terms of the SITC code numbers. For the sectors of transportation, commerce and services, however, the corresponding SITC data are not available or not identifiable so that all of the data in the UN trade yearbook are regarded as concerning the agricultural, mining and manufacturing industries, except for the data carrying the SITC code number 9 which are neglected here completely. The world imports are, of course, obtained by summing imports in the twenty countries listed in Table A-1. For some commodities in some countries, the commodity classification in the UN yearbook is not detailed enough to be compared with Table A-2, so that our data on world imports (W_i) contain some minor approximations which hardly influence the analyses of this paper.

Table A-1 Philippine Exports by Destination (All Commodities).

(thousand U.S. dollars and % in total)

Countries	1965		1969	
Total (all countries)	768, 448	(100.0)	854, 601	(100.0)
1. U.S.A.	348, 745	(45.8)	360, 327	(42.2)
2. Japan	217, 565	(28.3)	328, 811	(38.5)
3. Netherlands	59, 490	(7.7)	30, 325	(3.5)
4. Korea	9, 078	(1.2)	26, 134	(3.1)
5. West Germany	46, 865	(6.1)	19, 993	(2.3)
6. Taiwan	12, 441	(1.6)	14, 446	(1.7)
7. Hong Kong	2, 610	(0.3)	7, 629	(0.9)
8. Spain	4, 185	(0.5)	7, 005	(0.8)
9. United Kingdom	8, 521	(1.1)	6, 048	(0.7)
10. Singapore	1, 348	(0.2)	4, 738	(0.6)
11. Australia	3, 068	(0.4)	4, 465	(0.5)
12. Thailand	493	(0.0)	3, 999	(0.5)
13. Denmark	9, 479	(1.2)	3, 281	(0.4)
14. Italy	8, 148	(1.1)	3, 134	(0.4)
15. Canada	2, 107	(0.3)	3, 018	(0.4)
16. Sweden	10, 644	(1.4)	2, 579	(0.3)
17. France	6, 048	(0.8)	2, 264	(0.3)
18. Norway	1, 977	(0.3)	1, 741	(0.2)
19. Indonesia	376	(0.0)	864	(0.1)
20. Malaysia	89	(0.0)	563	(0.1)
Subtotal(1–20)	753, 277	(98.0)	831, 364	(97.3)

Source: Central Bank of the Philippines, *Statistical Bulletin,* Vol. XXVI, December 1974, Table 76 (pp. 159–196).

Table A-2 Commodity Identification Based on the Standard International Trade Classification (SITC).*

Industries	SITC Code Numbers
Agriculture, Fisheries and Forestry	00, 031, 041, 042-01, 043, 044, 045, 051, 052, 054, 055, 071, 22, 241, 242
Mining and Quarrying	28, 311, 312 (or 28, 321, 331)
Manufacturing	
1. Food manufactures	01, 02, 032, 042-02, 046, 047, 048, 053, 06, 072, 073, 074, 075, 08, 09
2. Beverages	11
3. Tobacco products	12
4. Textile manufactures, wearing apparel and made-up textile goods	21, 26, 65, 83, 84, 85
5. Wood, cane and cork products, except furniture	243, 244, 63
6. Furniture and fixtures	82
7. Paper and paper products	25, 64
8. Printing, publishing and allied industries	892
9. Leather and leather products, except footwear	61
10. Rubber products	23, 62
11. Chemicals and chemical products	271, 29, 4, 5
12. Petroleum refineries and other petroleum products	313, 314 (or 332, 334)
13. Non-metallic mineral products	272, 66
14. Basic metals	67, 68
15. Metal products, except machinery and transport equipment	69
16. Machinery, except electrical	71
17. Electrical machinery, apparatus and appliances	72
18. Transport equipment	73
19. Miscellaneous manufactures	81, 86, 891, 899
20. Scrap	—

* Derived by comparing the 1969 input-output table with the *Foreign Trade Statistics of the Philippines-1969* (Bureau of the Census and Statistics).

(iii) Deflators for the world imports. For the aggregate three sectors of agriculture, mining and manufacturing, world imports are deflated by the aggregate price indexes which are weighted averages of the price or unit value indexes for world exports of market economies in the *UN Yearbook of International Trade Statistics*. The weights are derived from our estimates of nominal W_i's in 1965 and 1969.

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